

A Survey of the Evidence for Intrahuman Killing in the Pleistocene¹

by Marilyn Keyes Roper

PREFACE

Recent studies of mammals in their natural habitat have contributed to a confirmation of the theory that man, alone, of the class Mammalia engages in intra-specific warfare. Another and perhaps more important result of these field studies has been the observation that even isolated killing between members of the same species is rare. According to Matthews (1964: 24):

It is, indeed, very difficult to find examples of true overt fighting resulting in the death of the loser among mammals under normal conditions in the wild. It occurs only when population numbers have overtaken the resources of the environment so that serious overcrowding is brought about. This produces a situation similar to that of animals in captivity where the environment is artificially restricted so that aggression is increased and any chance of escape from the aggressor is denied.

In the natural environment that is not overcrowded, the loser submits either by fleeing or by an act of surrender, such as, in both the case of the wolf and of the shrew, throwing himself on his back. Matthews concludes (p. 31):

There must be an extremely strong inhibition restraining the victor in a fight from giving the death blow when the rival submits. . . . Further work is needed to determine whether the inhibition is innate or learnt, but whatever its origin its effect prevents violent aggressive behaviour within a species from bringing about the death of large numbers of animals.

Studies in the field of some higher primate species have led to the conclusion (Hall 1964: 62) that in all

the species except the Temple rhesus, intergroup spacing is achieved without fighting, and dominance, in some cases, insures the withdrawal of one group just as it insures the withdrawal of the subordinate individual. Observations of chimpanzees in the Gombe Stream Reserve (Goodall 1963: 289) indicated that "when squabbles do arise, often over the merest triviality, they are usually settled by gestures and loud protest." Of six actions involving throwing which Goodall (1964: 1266) believed were aggressive, none was intraspecific: three were directed toward human beings and three toward baboons. It was, indeed, noted that occasionally when groups of chimpanzees met or when males were unable to obtain desired objectives, they put on displays which included throwing sticks, stones, and vegetation; but "objects thrown during these displays were not normally directed towards individuals; on the few occasions when they were, this seemed accidental."² Mountain gorillas, according to Schaller and Emlen (1963: 381), are quite peaceful both within their groups as well as among groups:

Overlapping of home ranges brings gorilla groups into close contact on occasion. In twelve definite meetings noted during the study, the groups usually passed each other slowly at distances of 300 feet or less, or sat near each other for varying lengths of time without actual interchange of individuals. However, partial or complete mixing of the two groups occurred at least four times. Once two groups remained near each other for three days before they were seen to mingle briefly.

Aside from man, baboons are the most successful terrestrial primates, and their ecology and social behavior have

MARILYN KEYES ROPER studied at Bryn Mawr College and completed her undergraduate work, after her marriage, at George Washington University (B.A. in elementary education, 1958). After a year's teaching in the public schools of Washington, D.C., she returned to her academic studies, earning an M.S. in archaeology from the University of Pennsylvania in May, 1968.

The present paper, submitted for publication 22 iv 68, was sent for CA☆ treatment to 50 Associates, of whom the following responded: Vijender Bhalla, C. Loring Brace, Raymond A. Dart, E. Lloyd Du Brul, W. C. Osman Hill, Armand M. Oppenheimer, Erik K. Reed, Adolph H. Schultz, and N. C. Tappen. Their comments are printed after the text and are followed by a reply by the author.

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² Junichiro Itani (personal communication, August, 1968) comments: "In the wild chimpanzee, we observed a case which seemed to be intraspecific killing or cannibalism (Akira Suzuki, unpublished). I believe that the case must be a new datum which has a close connection with the contents of this article."

been studied in an attempt to give insight into the problems which confronted early man (DeVore and Washburn 1963: 335). No aggressive interactions, Hall (1964: 56) reports, were recorded by himself or DeVore in over 2,000 hours of observation of baboons in the wild, even though these animals are considered very aggressive. Hall contends (p. 57):

Animals so socially conditionable as baboons have a highly articulated system of appropriate behavior patterns towards each other, within groups and between groups, so that this tremendous aggressive potential is rarely manifested toward species members.

If the above observations are confirmed by further studies, it would seem that man's "bestial" origins can no longer be considered a major factor contributing to murder and warfare, for animals in the wild under normal conditions do not exhibit this kind of behavior as a rule. Since intraspecific killing is so rare and warfare unknown in the extant mammal species (aside from *Homo sapiens*), several questions with regard to man may be posed. Did warfare, with its attendant motivations, begin the tradition of intrahuman killing, or was warfare superimposed on the base of an already established practice of intraspecific killing?

A number of anthropologists, sociologists, and psychologists (Davie 1929, Clarkson and Cochran 1941, Wright 1942, Bramson and Goethals 1964, Clark 1965, Fried *et al.* 1968) have become involved in the study of human violence and warfare—a phenomenon of most human societies. The word "most" is appropriate because, according to Margaret Mead (1940), the Greenland Eskimos and Lepchas of Sikkim, although their societies are not devoid of violence, do not understand the concept of war, even defensive war. In an attempt to answer some of the fundamental questions about intrahuman killing and warfare, social scientists have relied on anthropological studies of "primitive" and "civilized" societies as well as on psychological studies of 20th-century man. Often origins of war are hypothesized from one or both, or from a mixture of the data from these studies. Information gathered by archaeologists and physical anthropologists concerning early man is conspicuously absent from the source material for studies of warfare and violence. This lack is perhaps due to the fact that so few prehistorians have written about this subject specifically. Childe (1941, 1951) and Courville (1950) are the only persons, apparently, who have attempted to gather a body of data from the archaeological record on the possible evidences of violence and warfare in the time of world-wide preliteracy. New discoveries have been made since their writings.

The present paper is an attempt to collect and record the claims, based on material evidence, of archaeologists and physical anthropologists relating to intrahuman killing and warfare in the Old World during the Pleistocene. The individual claims (and counter-arguments) are scattered here and there throughout a large number of books and periodicals; gathering them together would seem to be a prerequisite to understanding how much data is involved, what possible conclusions can be drawn from the material now available, and what subsequent research needs to be carried out. Because I have not

personally studied the damaged fossil bones and the cave paintings which constitute most of the relevant material evidence, this article may be viewed as a basic preliminary survey (with occasional analytical comments) of the literature pertinent to the topic under consideration. In the past, the subject of intrahuman killing in the Pleistocene has received only sporadic attention by most prehistoric specialists (e.g., Vallois 1961: 231), but it is hoped that this situation is now changing and that more intensive research will be undertaken.

Probably none of the branches of human study can alone attempt to answer the complex questions relating to the broad root causes of organized warfare, based as it is on intrahuman killing. Concerning the helpfulness of ethnological data, Schneider (1952: 68) points out:

The contributions which the study of primitive fighting can make to a knowledge of the beginnings of warfare have been exaggerated. Preliterates are not contemporary ancestors. They are contemporaries. The primitive people of today are not retarded children of the human family, nor may data about them be used for purposes of historical reconstruction without considerable hazard.

This point of view is shared by Childe (1941: 126), who says that the "archaeologist's evidence is direct and free from the ambiguities inherent in the ethnographer's inferential data." Prehistoric archaeology also has its drawbacks, in particular the sparsity of human skeletal remains and artifacts from early times and the limited deductions about social phenomena that can be made from them.

Sound ethnological data may eventually be correlated with psychological studies and the prehistoric evidence of violence and warfare among early men for a better comprehension of root causes of these phenomena. It is primarily through an understanding of the causes of intrahuman killing and warfare that workable alternatives may be suggested. To that end this paper is dedicated.

INTRODUCTION

Two opposing viewpoints have long been held by theorists about early man's condition with regard to intragroup and intergroup hostilities. Advocates of one view (Boas 1912) held that ancient man lived in antagonistic hordes. Others (Perry 1917) believed that early men were peaceful and innocent, living in a "golden age." This difference of opinion persists. According to Lorenz (1966: 250):

It is no daring speculation to assume that the first human beings which really represented our own species, those of Cro-Magnon, had roughly the same instincts and natural inclinations as we ourselves. Nor is it illegitimate to assume that the structure of their societies and their tribal warfare was roughly the same as can still be found in certain tribes of Papuans in central New Guinea. Every one of their tiny settlements is permanently at war with the neighboring villages.

Montagu (1967: 47) contends, on the other hand, that:

Throughout the two million years of man's evolution the highest premium has been placed on cooperation, not merely

intra-group cooperation, but upon intergroup cooperation, else there would be no human beings today. Intra- or intergroup hostilities in small populations would have endangered the very existence of such populations, for any serious reduction in numbers would have made the maintenance of such populations virtually impossible. There is not in fact the slightest evidence nor is there the least reason to suppose that such conflicts occurred in human populations before the development of agricultural-pastoral communities, not much more than 10,000 years ago.

This paper is a collection of data pertaining to the specific question raised above—that is, whether or not our Palaeolithic ancestors engaged in intraspecific killing and warfare. Before presenting a survey of the detailed evidence, a review of man's development in the Pleistocene in terms of the general archaeological material available from each stage of his history in that era will be given.

In the general hominid stock which gave rise to modern man, three groups or major phases of morphological change have been distinguished. These three groups are: (1) the australopithecines, who lived, it is believed, primarily in Africa in the Lower to early Middle Pleistocene; (2) the pithecanthropines, often referred to as *H. erectus*, who inhabited Asia, Africa, and Europe in the Middle Pleistocene; and (3) the "Neanderthals," divided into two groups, (a) the classic Neanderthals, who lived in Western Europe from the beginning of the last glaciation (Würm) into the Würm I/II interstadial, and (b) the progressive Neanderthals of Southwest Asia and other regions of the Old World, whose date is also Würm I. In Europe in the Second and Third Interglacials (the Mindel-Riss and Riss-Würm, respectively), there are skeletal remains, many of which have been the subject of taxonomic controversy. In this paper they will be considered as a unit and called "pre-Würm I fossil men of Europe." Concerning the appearance of *H. sapiens*, Brothwell and Hughes (1966: 12) say:

In the European area during the period beginning approximately in 40,000 B.C. and ending in 26,000 B.C. (mid-Würm I to the end of the Interstadial Phase), significant cultural and biological changes occurred. During the course of this period it is considered, on the basis of both artifactual and skeletal evidence, that there was a replacement of Neanderthal varieties by Upper Palaeolithic people more nearly resembling modern Europeans.

Other *H. sapiens* skeletal remains dating from the Upper Palaeolithic have been found in Asia and Africa. Unfortunately, although the Upper Palaeolithic is well represented artifactually in the Near East (Braidwood and Howe 1960, Howell 1959, Esin and Benedict 1963, Coon 1951, Young and Smith 1966), human skeletal material is very rare (Coon 1962: 587).

For the greater part of the Pleistocene, there is little that archaeologists can glean from the cultural record. The most important materials are the skeletal remains of the early men themselves and of the animals they fed upon and the stone or bone tools they fashioned. Dart (1949) believes that some australopithecines lived in caves; Oakley (1955) doubts this, because he thinks hominids would not enter caves, or at least not sleep in them at night, unless they had fire with which to protect themselves from carnivores. There is no evidence of fire

in Africa, he claims, until the australopithecine phase has passed. The oldest undoubted hearths have been found at Locality 1 in the Lower Cave of Choukoutien, southwest of Peking. These hearths, it is believed, belonged to *H. erectus*.

There is some evidence that Neanderthals buried their dead with grave goods (Childe 1951: 74) as did the Cro-Magnons, perhaps the first representatives of *H. sapiens*. With the advent of Cro-Magnons, the first cave paintings as well as mobiliary art appear. Remains of huts built by hunting peoples of the terminal Pleistocene on the open steppe of Central Europe have been found (Klíma 1962: 195).

For the Lower and Middle Pleistocene, the only source of evidence of intrahominid violence is the human skeletal remains. Weapons of war cannot be distinguished from weapons for hunting until after the Pleistocene (Childe 1941: 130). With the introduction, in the Upper Palaeolithic, of wall paintings and mobiliary art, another source of evidence becomes available. There are drawings in two caves in southern France, dated to the Upper Palaeolithic, which depict intrahuman killing (Graziosi 1960: 158, 182).³ The open-air habitations of the mammoth-hunters of Central Europe present the possibility of two more sources of evidence of warfare in the Upper Palaeolithic: site destruction and fortifications. At the Gravettian encampment of Dolní Věstonice, which is dated by the radiocarbon method to about 25,000 years ago (GRO-2598, 2092, 1286), there are indications that a defensive structure circled the settlement. Klíma (1962: 201, 207) postulates that the protection sought, however, was against wild animals.

In places mammoth tusks were rammed into the ground to form—in conjunction with brush fill—simple defensive walls, beyond which all signs of habitation are absent. . . . The extensive deposits at the periphery of the settled area represent the remnants of simple ramparts, which apparently served the same function as the simple fire locations at the edge of the large dumps—that is, defense against wild animals.

Klíma does not mention any evidence of deliberate site destruction in connection with Dolní Věstonice or other Central European encampments of the Upper Palaeolithic. Thus, skeletal material from the Lower and Middle Pleistocene and skeletal material plus cave paintings in the Upper Palaeolithic constitute the only sources of evidence of intrahuman violence in the Pleistocene. Of these two sources, the skeletal material is much more abundant.

Concerning these human fossil remains, Carleton Coon (1962: 432) has concluded:

With a few exceptions, like that of Rhodesian man, who crawled into a narrow cave to die alone, nearly all the available

³ In eastern Spain there are rock paintings that clearly represent intrahuman violence, including individual killing as well as fighting between differentiated groups of "warriors." Although many older scholars, including Breuil and Frobenius, maintained that these paintings were made in the Upper Palaeolithic, there is today considerable difference of opinion with regard to their dating (Pericot and Ripoll 1964). Pericot's conclusion that the "classic" period, which includes the battle scenes, should be ascribed to the range of time between 8,000 and 5,000 B.C. seems, in the light of the available knowledge, the most convincing. Therefore, the Spanish rock paintings are not included in this study.

skeletal material from the Middle Pleistocene and some from the Late Pleistocene also, commemorates the ancient practice of man eat man. This does not mean that for hundreds of thousands of years every human being ended up in someone else's stomach; but if you are eaten, your bones have a better chance of being preserved for posterity than if your body is simply abandoned. Being tossed into a garbage dump is better from the archaeological point of view than being left for the wolves and hyenas on the lone prairie.

The above statement represents one viewpoint concerning the large number of cranial remains of the Pleistocene that exhibit an artificially enlarged opening of the foramen magnum, the enlargement supposedly having been intentionally made to facilitate removal of the brain for consumption. Some prehistorians (Bergounioux 1961: 114; Breuil and Lantier 1965: 232) believe, on the other hand, that many of these supposed examples of cannibalism in fact represent a funeral ritual with two-stage burials involving a skull cult.

In the context of this paper, cannibalism is not the issue; we are interested, rather, in evidence that the hominid was purposefully killed before he was eaten. Intraspecific violence in the Palaeolithic has often been suggested, usually on the basis of such evidence as depressed fractures of the skull, holes in the cranium with fracture lines radiating therefrom, and broken mandibles. In only two instances, apparently, are claims made for weapon-inflicted postcranial injuries (Shanidar III and Skhul IX) in the Pleistocene.

Weidenreich (1943: 187) explains depressed fracturing as follows:

Depressed fracturing, that is to say a compression of the bony substance itself, can occur only if the bone is still in a state of plasticity which means that it has not only preserved the organic substance in the bony tissue but also the contents of the spaces of the cancellous tissue and the bony canals, and more than this, the skull must have been covered by a scalp.

When a depressed fracture is found on a fossil skull, two explanations are possible: one, that the individual received the wound before death; the other, that his skull was struck very soon after death. If the area around the fracture shows any signs of healing, it must be deduced that the injury occurred before death and that the individual survived the blow, at least for a while. There are several ways that an individual could get a depressed fracture—for example, falling and hitting his head, being hit by a rock falling from a cave roof, or being purposefully or accidentally hit on the head by another hominid. After death, a skull which is still surrounded by organic material might be subject to a rockfall, a purposeful or accidental blow by hominids, or the action of carnivores. Usually, before a claim of a purposeful blow by another hominid is made by a physical anthropologist, careful observations are made involving the archaeological evidence surrounding the find of the fossil and other marks, if any, on the remains. Only those allegations made by well-trained physical anthropologists and archaeologists have been reviewed here.

Technically, even if all the cranial wounds involved in the various claims were in fact caused by the purposeful violence of other hominids, intraspecific killing could not be established before the Upper Palaeolithic, because it was not until the end of the Würm I/II interstadial that

it is fairly certain that only one hominid species, *H. sapiens*, was present. For the rest of the Pleistocene, hominids of several species or even of several genera may have lived in a given area at the same time. For example, the genus *Australopithecus* is divided into two species, *A. africanus* and *A. robustus* (Oakley 1954). Leakey (1961) has discovered at Olduvai another group of fossils which coexisted with some australopithecines and which he classifies as belonging to the genus *Homo* (*H. habilis*). Therefore, even if it is true, as Dart (1949b, 1962b) asserts, that blows on some australopithecine skulls were caused by other hominids, one still cannot be sure that intra-specific aggression was involved, since the identity of the attacker is unknown. This subject will be discussed more fully below.

To the reader who is unfamiliar with all the human remains from the Pleistocene, enumeration and discussion of just the skeletal material involved in claims of violence would give a distorted picture of the degree of possible violence and warfare in that period. Therefore, an attempt has been made to mention all the pertinent human skeletal material (in this case cranial remains) dating from the Pleistocene. As a result, the number of fossil men for which claims of violence have been made may be seen in perspective. Of course, even if the claims can be justified, this seemingly balanced picture must be very different from the true percentages of intrahuman killing in the Pleistocene. The small amount of human remains recovered, accidents of preservation and of discovery, and the relative youth of the field of prehistoric archaeology based on scientific methods all contribute to this situation.

EVIDENCE FROM SKELETAL REMAINS

AUSTRALOPITHECINES

Hominid remains dating to the Lower to early Middle Pleistocene (Villafranchian) have been found in the South (Coon 1962: 256; Dart 1962c: 285), East (Leakey 1966: Table I), and North (Coppens 1961) of Africa. Of these hominid remains, approximately 36 individuals are represented by cranial parts (aside from a few isolated teeth). Of these 36 individuals, 20 are specifically said to have met their death due to purposeful violence by other hominids. Dart (1949b, 1962c) and Ardrey (1961: 299) have made this statement about 19 South African australopithecines and Leakey (1961) about one "*Homo habilis*" at Olduvai in East Africa (see Table 1).

In passing, it should be mentioned that Leakey (Leakey, Tobias, and Napier 1964: 9) has also intimated that an australopithecine that he calls *Australopithecus* (*Zinjanthropus*) *boisei* may have been the victim of *H. habilis*, another hominid type that Leakey, Tobias, and Napier believe is more advanced than "*Zinj.*" From the remains of *Zinjanthropus* (cranial and otherwise) at Olduvai and elsewhere, there is no evidence to support this intimation. On the contrary, with reference to the *Zinjanthropus* find at FLK I, Leakey (1959: 491) stated:

It is of special importance to note that whereas the bones of the larger animals have all been broken and scattered, the hominid skull was found as a single unit within the space of approximately one square foot by about 6" deep. . . . The condition of

TABLE 1
LOWER TO EARLY MIDDLE PLEISTOCENE HOMINID REMAINS (CRANIAL)

SITE	NAME OF HOMINID	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Taung (S. Africa)	<i>Australopithecus africanus</i>	1 incomplete skull with natural endocranial cast.	Dart 1949 <i>b</i> :37	Washburn 1957; Mason 1961; Coon 1962:239
Makapansgat (S. Africa)	<i>Australopithecus prometheus</i>	a) original find: 1 occipital bone and posterior third of each parietal	Dart 1949 <i>b</i> :38	
	<i>Australopithecus prometheus</i>	b) fragmentary skull from pink breccia and 11 mandibles from various strata	Dart 1962 <i>c</i> :285	
Sterkfontein (S. Africa)	<i>Plesianthropus transvaalensis</i>	2 crania (one almost complete) 1 endocranial cast	Dart 1949 <i>b</i> :37-38	
Swartkrans (S. Africa)	<i>Paranthropus crassidens</i>	8 partial crania	Ardrey 1961:299	
Kromdraai (S. Africa)	<i>Paranthropus robustus</i>	1 fragmentary cranium and endocranial cast	Dart 1949 <i>b</i> :38; tentatively supported by Coon 1962:238; Schepers 1946	
Olduvai FLK I (Tanganyika)	<i>Zinjanthropus</i> (Olduvai hominid No. 5)	1 cranium	Leakey, Tobias, and Napier 1964:9	Leakey 1959:491
	<i>Homo habilis</i> (Olduvai hominid No. 6)	cranial fragments and 2 teeth		
Olduvai FLKNN I (Tanganyika)	<i>Homo habilis</i> (Olduvai hominid No. 7)	parts of 2 parietal bones and mandible (broken)	Leakey 1961:348; Halberstram 1961:11	Montagu 1967:8-9; Coon 1962:282, 284
	<i>Homo habilis</i> (Olduvai hominid No. 8)	fragments of adult skull		
Olduvai MNK II (Tanganyika)	<i>Homo habilis</i> (Olduvai hominid No. 13)	part of 1 skull including most of occipital bone, 2 parietals, part of frontal and parts of both temporals		
	<i>Zinjanthropus</i> (Olduvai hominid No. 14)	a few fragments of a cranial vault		
Olduvai FLK II (Maiko Gully) (Tanganyika)	probably pithecanthropine or a type of <i>Zinjanthropus</i>	considerable parts of cranial vault and most of teeth (specimen badly crushed by Masai cattle)		
Koro Toro (Chad)	australopithecine or <i>Homo habilis</i> (?) (Tobias 1965)	skull fragment, part of frontal, and facial bones		
Sangiran (Java)	<i>Meganthropus palaejavanicus</i>	mandibular fragment		

the skull vs. the condition of the other bones indicates clearly that this skull represents one of the hominids who occupied the living site, who made and used the tools and who ate the animals. . . . There is no reason whatever in this case to believe that the skull represents the victim of a cannibalistic feast by some hypothetical more advanced type of man.

Later, after finding the remains of "*H. habilis*" at the earlier FLKNN I location and some "*H. habilis*" remains (cranial fragments and two teeth) at the site where *Zinjanthropus* was found, Leakey changed his mind about the maker of the tools. This change cannot, however, alter the foregoing statements about the condition of the *Zinjanthropus* skull. For the other *Zinjanthropus*-type remains (Tobias and von Koenigswald 1965: 427; Tobias 1965: 406) subsequently found at Olduvai—i.e., Olduvai hominids 15 (strata overlying that of MNK II), 16 (FLK II), and possibly 14 (MNK II), as well as the Lake Natron (Leakey and Leakey 1964) specimen—no specific claims of violence have been made.

As noted above, assertions of purposeful hominid violence have been made in connection with the remains of 19 South African australopithecines. The skeletal evidence comes from the five main bone breccia sites of Taung, Makapansgat, Sterkfontein, Swartkrans, and Kromdraai. The first three sites listed probably date to the Lower Pleistocene (Oakley 1961: 96) and contain only *A. africanus* specimens, whereas the latter sites are later, probably early Middle Pleistocene, and contain *A. robustus* (*Paranthropus*) remains.

Ardrey (1961: 299) has stated about one of the fossil hominids from Swartkrans:

. . . a curious case of what could only have been intentional, armed assault came my way in 1955 when Oakley, in London, gave me the plaster cast of a small portion of an australopithecine skull from Swartkrans. The skull showed two small round perforations, about an inch apart. The holes could not have been of animal origin, since no carnivore has canines set so closely together. I was on my way at the time to Pretoria, and so Oakley asked me to inquire of John Robinson whether the original specimen (this was only a cast) showed the crystals of fossilization down into the holes. Could the marks, in other words, have been of post-fossilization origin? In Pretoria, Robinson gave the answer. The holes showed crystals all the way through. The living australopithecine, three quarters of a million years ago, had been struck with something. Not only had he been struck once. He had been struck twice. The holes came from slightly different directions.

Six fragmentary australopithecine skulls, three from Sterkfontein and one each from Taung, Makapansgat, and Kromdraai, are reported to show evidence of blows (Dart 1949; see Appendix A for his description of this supposed evidence). The line of reasoning upon which Dart claims that the hominids were purposefully killed is as follows: (a) 80% of the 58 baboon skulls found at Taung, Sterkfontein, and Makapansgat

exhibit evidence of having been subjected to purposeful violence that could only have been inflicted by implements held in hands or by the crushing hands themselves. Not only the skulls of baboons but also most of the adult specimens of the australopithecine group represented by skulls or endocranial casts exhibit depressed fractures.

(b) The depressed fractures were made by implements fashioned by the australopithecines from animal bones

(Osteodontokeratic Culture). One of the distinctive marks made by these implements was a paired depression apparently caused by the condyles on the distal end of the humerus of a large ungulate. These characteristic double fractures have been observed on a number of baboon skulls and on one of the australopithecine skulls, type 2 from Sterkfontein. (c) These depressed fractures could not have been caused by settling of deposits on an exposed skull, for, as Schepers has said,

settling floor deposits would either slowly warp the respective bones and distort the whole skull, or would be referred to the suture lines, which would tend to be pried apart in a completely dessicated skull.

The remains of 12 more *A. africanus* individuals (perhaps 13, if the mandible tentatively attributed to the original find in fact represents another individual) found at Makapansgat since 1953 have also been so interpreted (Dart 1962a,c). Of these, Dart (1962c: 268–69, 285) states:

The specimens range through the entire cavern time cycle of 50,000 years or more; they represent many growth stages from early infancy, through adolescence, early and mature childhood to advanced old age. The conditions under which they have been found are consistent with the concepts of their demise through violence, their fragmentation as a consequence of cannibalism and their living in small family groups. . . . No evidence has been forthcoming hitherto that the local promethan australopithecines (*A. africanus*) varied appreciably in their morphology or in their essentially carnivorous habits during that lapse of time. There is no evidence that the killing and sundering of australopithecine bodies at this site could have been carried out by other than australopithecine agency during the ordinary course of the cavern's existence.

Only *A. africanus* remains are found in the cave, and Dart is indeed claiming intraspecific aggression. Others disagree, and for multiple reasons. Mason (1961, cited in Robinson 1963) believes that a larger-brained hominid (hominine) was living in South Africa at the same time as *A. africanus* and preyed upon him. Robinson (1963: 395) also believes that a hominine was contemporaneous with *A. africanus*—at least in the Sterkfontein valley. Washburn (1957: 612) thinks that hyanids were responsible for killing both the large game, remains of which were also found in the cave, and the australopithecines. Coon (1962: 232, 239) concludes, "whatever made them, the paired depressions on the baboon skulls are the likeliest evidence that the Australopithecines hunted at all, but they are not convincing, for two reasons."

One of the reasons that Coon points out is that

the Taung site consists of a dolomite plateau scored by deep cracks. . . . Sterkfontein was a cave which had a hole in its roof in Australopithecine times. . . . Taung and Sterkfontein were holes into which animals fell, or their bones were washed. Neither was a habitation site. Both were naturally formed refuse pits.

The second reason is similar to Washburn's. The Makapansgat site, which was a cave, yielded many antelope and baboon remains besides the fragmentary remains of the australopithecine skulls. Judging by the juvenile and other small animal remains found in association with hominids in the Lower Pleistocene deposits at Olduvai (Bed I), Coon concluded that *A. africanus* would not have been capable of killing the antelope and adult

baboons found at Makapansgat. Therefore some other animal must be responsible for the piles of bones in the cave, including those of the australopithecines.

The problem with Coon's latter argument is that the Olduvai hominids may be, as has been conjectured by some (Harrison, Weiner, Tanner, and Barnicot 1964: 64), representatives of the *A. robustus* group whereas the South African australopithecines from the sites of Taung, Sterkfontein, and Makapansgat are *A. africanus*. If Robinson is correct in his theory (based in part on the shape and condition of the teeth of the two species) that *A. africanus* was omnivorous while *A. robustus* was primarily herbivorous, then we cannot determine what the dietary remains of the former would be from the actual dietary remains of the latter.

Dart's claim that the *A. robustus* individual from Kromdraai was killed by another australopithecine is taken quite seriously by some physical anthropologists because a piece of rock was found imbedded in the skull. Schepers (1946), who took out the rock piecemeal, thereby destroying the evidence, concluded:

The presence of this rock is evidence suggestive of the claims that have been previously made that the Homunculi represented by the Australopithecoid and Plesianthropoid fossils were skilled enough to employ missiles or weapons for defensive, offensive, and predatory purposes.

In a section entitled, "Did the Australopithecines Make Tools?," Coon (1962: 238) comments:

A direct bit of evidence is Schepers' discovery of a piece of "flint-like rock" imbedded in the skull and endocranial cast of a Kromdraai specimen, who may have died as a result, but the victim could have lived late enough to have been killed by a pioneering Middle Pleistocene *Homo*.

Robinson (1963: 393) does indeed suggest that *A. robustus* (*Paranthropus*) shared the same territory with an early hominine. If we knew the type of stone tool (if it was a tool) that was imbedded in the skull of the Kromdraai specimen, we might have some clue as to the attacker, but the tool was destroyed while being removed. However, the controversy concerning whether the australopithecines or an early representative of the genus *Homo* made the first stone tools is relevant to the question of who may have attacked the *Paranthropus* from Kromdraai.

Tobias (1965: 394-96) suggests that *H. habilis* made the first real stone tools (Oldowan Culture) and that the australopithecines did not. His conclusion is based on the evidence that, in Africa, there are six sites which exhibit stone tools as well as hominid remains: MNK I, FLKNN I, FLK I, and MNK II at Olduvai; Swartkrans; and the middle breccia from the Sterkfontein Extension site. At all these sites, he suggests, there is evidence of a hominid more advanced than the australopithecines, even though at three of the sites, Olduvai FLK I and MNK II and the Sterkfontein Extension site, australopithecine remains are also present. In his survey, Tobias discounts the claim (Brain, Lowe, and Dart 1955) of stone tools in the upper breccias at Makapansgat and has assigned three of the six hominid fragments (teeth) from the middle breccias at the Sterkfontein Extension site, which Robinson (1957) classified as australopithecine, to the genus *Homo*. "In

brief," sums up Tobias (1965: 407), "the presence of something more advanced than the australopithecines is the *sine qua non* for the presence in a hominid deposit of stone tools." Robinson (1963: 398) has also admitted that "despite commonly held opinion to the contrary, there is as yet no proof that either form of Australopithecine possessed a settled stone culture."

Thus there is no conclusive evidence of intraspecific violence among the South African australopithecines. There are indications, in particular the double depressed fractures of Sterkfontein type 2 and the piece of rock in the skull of the Kromdraai *Paranthropus*, of some form of hominid assault—but the species responsible is not clear.

In East Africa, evidence of violence has been claimed by Leakey who stated (1961) that the 11-year-old pre-*Zinjanthropus* child (later, type specimen of *H. habilis*) found at the site of FLKNN I at Olduvai died of a blow to the head. As evidence, he offers the broken mandible and one of the two pieces of parietal bone which shows a depression with fracture lines radiating therefrom. From Washington, D.C., Halberstram (1961: 11) reported:

Dr. Leakey, who was here under the auspices of the National Geographical Society, told the news conference that he believed the child had been murdered. . . . He said the death did not come from a fall.

Coon (1962: 282, 284) reports the broken mandible and the depressed fracture on the left parietal with radiating cracks and comments that the injuries may have been inflicted "pre or ad mortem." Montagu (1967: 8-9) declares:

A fractured skull and a broken jaw have been found among australopithecine remains, and these have been attributed by Leakey, as he fetchingly puts it "in police parlance," "to a blow from a blunt instrument." The truth is that no one can say what such fractures may be due to. Leakey's "modern police parlance," refers, of course, to murder. As one who for over thirty years has served as an expert witness in interpreting the manner in which various bones have come to be fractured, I could think of a score of causes wholly unconnected with a "blow from a blunt instrument." But the proponents of the doctrine of "innate aggressiveness" are uninterested in such alternative explanations.

Montagu does not go on to discuss the alternative explanations. As he points out, however, Leakey's assertion is certainly open to question.

For the rest of the australopithecine-type skeletal material, there seem to be no claims of violence.

PITHECANTHROPINES

Cranial remains of seven pithecanthropine individuals have been found in Java (Weidenreich 1945; Jacob 1964, 1967). From the Lower Cave of Choukoutien, China, there are remains of over 40 pithecanthropine individuals. These Choukoutien fossils include portions of 14 calvaria and 12 mandibles. Recently, a mandible and partial skull representing two more pithecanthropines have been found in Shensi province, China (Woo 1966). Aside from small isolated fragments, the Java, Choukoutien, and Shensi material represents the only skeletal remains of pithecanthropines reported from East Asia. The

TABLE 2
EARLY MIDDLE PLEISTOCENE PITHECANTHROPINE REMAINS (CRANIAL)

SITE	NAME OF HOMINID	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Trinil (Java)	<i>Pithecanthropus</i> I	calvaria		
Sangiran (Java)	<i>Pithecanthropus</i> II	calvaria		
	<i>Pithecanthropus</i> III	parietal		
	<i>Pithecanthropus</i> IV	posterior part of calvaria	Weidenreich 1945:17; supported by Courville 1950:193	Weidenreich 1943:190
Modjokerto (Java)	<i>Pithecanthropus</i> <i>modjokertensis</i>	calvaria (infant)		
Sangiran (Java)	<i>Pithecanthropus</i> VI	calvaria		
Putjung (Java)	<i>Pithecanthropus</i> VII	calvaria		
Shensi Province (China)	a) Chenchiaowo mandible b) "Lantian Man"	a) mandible b) cranium		
Choukoutien Location I Locus B:39.2 (China)	Skull I adult (M)	a) right parietal b) fragment of left half of frontal	Weidenreich 1943; supported by Courville 1950:193; Coon 1962:432; tentatively by Vallois and Boule 1957:145; Lorenz 1966:239	Montagu 1967:9; Bergounioux 1961: 114; Breuil and Lantier 1965
Choukoutien Location I Locus D (Lower Fissure)	Skull II adult (?)	1 calva (both temporals and occipitals missing)		
Choukoutien Locus E (Lower Fissure)	Skull III juvenile (M)	calvaria		
Choukoutien Locus G	Skull IV adolescent (F)	1 fragment of right parietal		
Choukoutien Locus H (1934) Locus H (1936) 24:27:13	Skull V adult (M)	a) left temporal bone with adjacent parts b) fragments of right temporal		
Choukoutien Locus I, level 22 layer 80 36:87 L-2 85 F-3 88 F-3	Skull VI adult (F)	a) fragment of frontal b) fragments of left c) fragment of right parietal		
Choukoutien Locus I, level 22, 36:81	Skull VII adolescent (M)	fragment of right parietal		
Choukoutien Locus J, level 23, 36:95, B-3	Skull VIII juvenile (F)	fragment of occipital bone		

TABLE 2 *continued*

Choukoutien Locus J, level 23, 36:95, L-3	Skull IX juvenile (M)	a) fragment of frontal b) 4 small fragments without connection		
Choukoutien Locus L, level 25, 36:155, J-3	Skull X	a) calvaria: right temporal bone missing b) frontal process of left maxilla c) fragment of left zygomatic bone		
Choukoutien Locus L, level 25, 36:155, J-3	Skull XI adult (F)	a) calvaria b) fragment of left maxilla with 5 teeth c) right half of palate		
Choukoutien Locus L, level 25, 36:166, I-2	Skull XII adult (M)	calvaria		
Choukoutien Locus O, level 29, 37:186	Skull XIII	left maxilla with 6 teeth		
Choukoutien Upper Cave 33:32, D-4	Skull XIV	left maxilla with 4 teeth		
Ternifine (Algeria)	<i>Atlantropus mauritanicus</i>	3 mandibles and small piece of parietal		
Sidi Abderrahman (Morocco)	<i>A. mauritanicus</i>	mandible		
Heidelberg (Germany)	<i>Homo heidelbergensis</i>	mandible		
Olduvai LLK II (Tanganyika)	"Chellean Man"	calvaria		

Mauer mandible from Germany is classified by most physical anthropologists as a pithecanthrope, as are the Ternifine, Sidi Abderrahman, and Olduvai (Chellean Man) remains from Africa. All the pithecanthrope material is now generally considered as *H. erectus*, with the Javanese and Choukoutien forms as different races or subspecies (Harrison *et al.* 1964: 68), the former appearing somewhat earlier in the Middle Pleistocene than the latter. According to Oakley (1962), the Djetis beds, in which the earliest *H. erectus* fossils were found, date to *ca.* 600,000. The succeeding Trinil beds are about 500,000 years old (K/A technique), and the Lower Cave at Choukoutien is about 400,000 years old (K/A and pollen analysis).

Claims of intraspecific killing with regard to *H. erectus* are restricted to *Pithecanthropus* IV (Weidenreich 1945) and the *H. erectus* remains from the Lower Cave at Choukoutien (Weidenreich 1939c, 1943) (see Table 2).

Pithecanthropus IV, recovered from the Djetis layer in Java, consists of a calvarium that, according to Weidenreich (1945: 17), shows evidence of a blow cleaving the skull and breaking the basilar process of the occipital

bone from its normal position. "The maxilla displays the same signs of violence." This allusion to assault, however, is tempered with the admission (Weidenreich 1943: 190) that:

All the Pithecanthrope material came from volcanic deposits and was transported by mud streams together with pebbles and boulders to the site where it was recovered. The crushing (when the soft parts surrounded the bones) may therefore be the consequence of elemental accidents rather than of the incidental actions of man.

Even if *Pithecanthropus* IV indeed met his death through purposeful violence, it would represent a definite example of intraspecific killing only if no other hominid species were present; and "*Meganthropus*," believed to have been an *A. robustus*, is also found in the Djetis bed. Robinson (1963) states that:

In Java the Sangiran site has yielded both "*Pithecanthropus*" and "*Meganthropus*" remains. According to von Koenigswald *Pithecanthropus* IV and the type mandible of "*Meganthropus*" came from the Black Clay (Putjangan beds) not far from each other. . . . Therefore it would appear that "*Pithecanthropus*" and "*Meganthropus*" occurred synchronously at Sangiran . . .

As with the australopithecines, then, no definite claim of intraspecific violence can be made with regard to *Pithecanthropus* IV.

The Lower Cave of Choukoutien, Locality 1, may be termed the type site for evidence of murder and cannibalism in the Palaeolithic as represented by popular literature and even by some prehistorians. Weidenreich, the physical anthropologist appointed to study the pithecanthropine material from this site, has argued (1939c) that the pithecanthropines were not only eaten by members of their own species, but also killed by them. Skulls, showing marks of violence, and other pithecanthropine skeletal material were reportedly found strewn around on the living floors, mixed with the remains of different animal species. The extremity bones of the hominine are said to have been cracked to extract the marrow, and pithecanthropine remains as well as animal bones are alleged to show signs of fire.

In his detailed study of the 14 reconstructed crania (1943), Weidenreich was less firm in his claims of intraspecific killing and consumption than in his earlier reports. Nevertheless, after looking at the depressed fractures and other marks on skull caps from many points of view and considering a number of possible alternative explanations to murder and cannibalism, he returned to his original conclusion (Weidenreich 1943: 190):

The strange collection of human bones we are facing in Choukoutien has been made by *Sinanthropus* himself. He hunted his own kin as he hunted other animals and treated all his victims in the same way.

The remains from Choukoutien unfortunately disappeared during World War II. Weidenreich's studies are the primary source of knowledge about them. In order to obtain a clear picture of the evidence upon which Weidenreich bases his claim of intraspecific killing, the skeletal evidence for cannibalism must be separated from the skeletal evidence for violence.

The evidence for cannibalism presented by Weidenreich (1939b, c, 1941, 1943) is as follows:

1. Of the 11 postcranial bone fragments, all apparently damaged before fossilization except Femur I and perhaps Femur II (Weidenreich 1941: 74–77), two seem to show evidence of human manipulation. Femur III and Femur VII indicate that long splinters were cleft from the shaft longitudinally, so that the medullary cavity lay exposed. Only humans are believed to be able to break bone in this way.

2. One bone fragment shows signs of burning (Weidenreich 1939c: 53, citing the chemical analysis by S. D. Wilson of Yenching University; cf. Oakley 1961: 184, however, who states that “in the Choukoutien deposits . . . only animal bones were in a charred or calcined condition”).

3. All but two of the 12 mandible fragments seem to have been broken “either exactly in the midline or immediately next to it” (Weidenreich 1939c: 56).

4. All of the 14 reconstructed skulls lack the central parts of the base (Weidenreich 1943: 186–90). (Since some of the “skulls”—I, IV, VII, VIII, and XIV—are represented only by very small fragments of the brain pan, this statement may be misleading.) Skull III has many abrasions, due either to “violent acts before or after death or later erosion.” Skulls II and VI exhibit artificial

grooves which could have been caused either by an implement or by “accidental rubbing by sharp stones.” Skull V has

irregular scratches that cover the temporal squama. In addition the breakage of the superior margin of this fragment is composed of a number of shorter breakages with straight contours which give the impression they were cut off piece-meal with implements.

The evidence for intraspecific killing is confined to depressed fractures on four skulls (VI, X, XI, XII). Weidenreich himself has made such a good case (1943: 189) for the injuries of VI being due to a falling rock and/or bites of carnivores that purposeful violence by other hominines is questionable in this instance. The injuries of the remaining three skulls are described in terms of violence (see Appendix B). It is interesting that all three were found in a level (no. 25) that did *not* contain bones of other animals or worked stones (Vallois and Boule 1957: 134). No excavation report has apparently been published of the discovery of these three skulls in 1936, but a brief note in *Nature* by Pei (1936: 1056), who did much of the excavation work at Choukoutien, provides some details:

Referring to the notes published in *The Times* (London) on Nov. 20 and 28, concerning the recent discovery of two skulls of *Sinanthropus*, I am writing to confirm the fact that the information contained in these notes is correct. (*The Times* has since published on Dec. 8 an article announcing the discovery of still another skull. The information contained in this latter article is now confirmed by letters from Dr. Young and Mr. Chia just received; but I am awaiting further information for details of this 5th skull.) . . . On Nov. 16 Mr. Chia discovered two skulls of *Sinanthropus*. Concerning these two latest skulls, a letter from Père Teilhard de Chardin says, “Two crushed but largely preserved *Sinanthropus* skulls have been found, some three meters above the lower cave and only a short distance from the front of your own excavation. . . the skulls were found in a place practically barren of bones and implements in a matrix sandy and brecciated in places.”

Since these three skulls were not found mixed with animal bones on the living floors of *Sinanthropus*, it does not seem right to include them among the evidence for the claim that “*Sinanthropus* hunted and killed his own kin as he hunted other animals and treated all his victims in the same way.”

Bergounioux (1961: 114) and Breuil and Lantier (1965) have presented explanations for the condition of the pithecanthropine material at Choukoutien that differ radically from Weidenreich's. According to Bergounioux:

No one today disputes the fact that *Sinanthropus* was a man and the maker of tools and fire. The very scanty limb bones found appear to have no significance and must have been taken to the cave by accident. There is no trace of teeth [marks] in any of them, although they are often present on broken and scraped animal bones. Skulls and jaws are present in such large numbers that one is led to assume that they were carried there intentionally. Furthermore, in four of these the occipital part was raised by successive fractures, as if there had been an attempt to reach the brain. This suggests funeral rites of the type known as “two-stage,” which were still observed among the Buginese on the south coast of the Celebes, before their conversion to Islam in the eighteenth century. The body of the deceased was carried far from the dwelling and left in the open, sheltered from beasts of prey. When the body had dried out, the head could be detached easily, without the need even to cut the

TABLE 3
PRE-WÜRM I FOSSIL MEN OF EUROPE (CRANIAL REMAINS)

PERIOD	SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Mindel/Riss Interglacial	Steinheim (Germany)	1 cranium	Blanc 1961:129	Bergounioux 1958:151
	Swanscombe (England)	1 calva		
Riss/Würm Interglacial	Fontéchevade (France)	a) frontal bone b) calotte	b) Vallois 1961:231; supported by Coon 1962:499	
	Monsempron (France)	a) cranial fragments and mandible b) maxilla		
	Saccopastore (Italy)	a) female cranium b) parts, male skull		
	Ehringsdorf (Germany)	a) parts of female cranium b) remains of child's skeleton	a) Weidenreich 1928:135; 1943:190; supported by Keith 1931:319; Hrdlička 1930:238; Vallois and Boule 1957:181; Courville 1950:191	Blanc 1961:128; Breuil and Lantier 1965:232
	Gánovce (Czechoslovakia)	natural casts of brain		
	Krapina (Yugoslavia)	remains of 13 individuals (fragments of 10-12 "skulls")	Vallois 1961:228; supported by Courville 1950:189	

cervical vertebrae. (No vertebrae were found at Choukoutien.) The skull was then solemnly carried to the village, carefully washed, and became a kind of protective divinity of the family of the deceased. Sometimes only the jaw was preserved, and it was worn around the neck, suspended from a cord, like a medal. Acts of ritual anthropophagy were associated with this cult; the occipital hole was enlarged with blows from a club on the base of the skull, then the brain was devoured by those who wished to assume the virtues and merits of the dead man. . . . Although we are not able to prove them, the conclusions that can be drawn from such comparisons are striking. Jaws and broken skulls reveal a funerary cult, the importance of which cannot be exaggerated.

Bergounioux's theory is based on (a) the fact that no cervical vertebrae were found in the cave, as would be the case if the heads had been freshly severed from the body, and (b) the fact that the amount of cranial material discovered in the cave is way out of proportion to the amount of postcranial material. It does not quite fit the case of the three skulls under consideration, however, in that, judging by the absence of other animal bones and stone tools, this level was not a living floor of *Sinanthropus*. The skulls were not "residing" with the living—at least, it would seem, not in close proximity.

Perhaps the difficulty in hypothesizing the events which led to the presence of the pithecanthropine material in the cave at Choukoutien lies in the fact that attempts are made to make one explanation fit all the material. With reference only to the three skulls in question, the following course of events may be sug-

gested: (a) the three individuals were purposefully or accidentally killed; (b) their bodies were allowed to rot in a protected place somewhere outside the cave; (c) when the crania could be detached without cutting the cervical vertebrae, the "skulls" were taken to the cave (sacred place?) by people who probably lived nearby but not in this cave.

Once cannibalism is separated from the cause of the demise of the three pithecanthropine individuals, or replaced by ritual cannibalism after an accidental death, the purposefulness of the "blows" which caused the depressed fractures becomes more open to question. As with the australopithecine material, accidental falls or rockfalls as well as homicide could have produced the depressed fractures.

PRE-WÜRM I FOSSIL MEN IN EUROPE

Eight sites have yielded hominid cranial material from the important pre-Würm period in Europe: Steinheim and Ehringsdorf in Germany; Swanscombe, England; Fontéchevade and Monsempron in France; Saccopastore, Italy; Gánovce, Czechoslovakia; and Krapina, Yugoslavia. Over 25 individuals are represented. Claims of death due to purposeful violence by other hominids have been made with regard to fossils at four of the eight sites—Steinheim, Ehringsdorf, Fontéchevade, and Krapina—and involve 16 individuals (see Table 3).

The earliest claim for violence in Europe is attached to the Steinheim skull, found in a gravel pit at Steinheim, 12 miles north of Stuttgart. There were no implements in the gravels that held the skull (Coon 1962: 492). Associated faunal evidence indicated that the cranial material was of Second (Mindel-Riss) Interglacial Age. Blanc (1961: 129) quotes Berckhemer (1934) who, noting the missing parts of the edge of the foramen magnum, concluded that "it is legitimate to assume that we are facing an extended artificial widening of the foramen performed for the purpose of extracting the brain." Blanc continues:

... the Steinheim skull shows another extensive mutilation on the right temporal area. The features of the mutilation point to a strong blow received before death, just as in the case of the similar mutilations shown by the Circeo skull.

Blanc has asserted that the Circeo individual was probably murdered, and he argues the same for the Steinheim man.

Concerning the taxonomy of the Steinheim skull, Coon (1962: 493) says that it is one of the oldest specimens of *H. sapiens*. Clark (1955: 63–64) concurs. Vallois and Boule (1957: 177) classify it as pre-Neanderthal, noting that Neanderthal characteristics exist side by side with modern characteristics. Berckhemer believes that the Steinheim fossil represents a branch both more ancient and more primitive than the Neanderthal branch, but closer to modern man. Brothwell and Hughes (1966: 6) tentatively assign the Steinheim skull to *H. sapiens*.

The rest of the reported evidence of purposeful violence is dated to the Riss/Würm Interglacial.

The vault of a human skull found in a travertine deposit in a quarry near Ehringsdorf was assessed by Weidenreich (1928, cited in Hrdlička 1930), who studied and restored it, as follows: "Unmistakable dents on the frontal made partly by sharp, partly by dull stone implements, render it probable that the individual had been killed." Keith (1931: 319, and 328, Fig. 106) comments:

Professor Weidenreich was surprised to find, as he made a careful examination of the frontal bone, that there was clear evidence of five wounds all of which had been inflicted when the bone was fresh, whether before, at, or just after death cannot now be determined. Of these five wounds one, upon the right side of the forehead, was caused by a blow from a blunt implement, delivered with such force that a rounded area of the bony wall was forced inwards and shivered—enough to produce immediate loss of consciousness. The other four wounds were such as might have been produced by a flint implement with a sharp edge; one blow, over the left orbit, caused a linear fracture to spread upwards to the vault; the other three, delivered over the right orbit, were vertical in direction; a piece of bone over the right orbit had been separated by these blows.

The stone tools found with these remains were not a homogeneous industry. They included scrapers of Charentian type, derived from Tayacian; Micoque-type handaxes; angular scrapers; and crude burins and graters. Says Coon (1962: 505):

The diversity of these implements and of their geographical associations suggests that the people who lived at Ehringsdorf during the late Last Interglacial time may have been the product of mixture between several populations.

Difference of opinion has been expressed about the taxonomic position of the Ehringsdorf cranium. It is classified either as *H. sapiens* (e.g., Coon 1962: 506) or as progressive Neanderthaloid (e.g., Harrison *et al.* 1964: 78).

In a cave at Fontéchevade in southern France, the remains of one of two individuals (Fontéchevade II, probably a male) associated with a rather pure Tayacian industry and Last Interglacial fauna have been described by Vallois (1949: 340–41) as follows:

... the vault had been subjected to the very violent effect of fire, which had left a characteristic imprint on the right side. The posterior part of the left parietal also displays a hole, with depressed edges, which appears to be the result of a blow received when the bone was still fresh. This fact, together with the absence of other fragments of the same skull or of any part of the rest of the skeleton in the vicinity, weighs against the suggestion of an intentional burial.

Vallois (1961: 231) has since restated his claim in a stronger way:

The Tayacian Fontéchevade skullcap (skull No. 2) exhibits in the occipital region marks of a violent blow that appears to have been made before death; its parietal region had undergone the action of fire.

Coon (1962: 499) comments, "The left parietal contains a hole with depressed edges, suggesting death by violence, at an age of forty to fifty years; shortly after death the bones were charred."

An interesting sidelight on Fontéchevade II, which Vallois states is definitely pre-*sapiens*, is that its cephalic index has been calculated as "seventy-nine or a little more" (Coon 1962: 510). This is at the upper extreme of the mesocephalic range (75.0–79.9). Among the fossils alleged to show violence from Krapina, the four skulls "which are whole enough to give an idea of head shape, are round-headed individuals, like the majority of living Croats." The evidence is too meagre, of course, but the possibility must not be ruled out that we have here an indication of selection of victims—the selection being based on racial or specific differences. Klaatsch (cited in Keith 1928: 197) has suggested that some of the individuals found at Krapina "may represent captives which Neanderthal people had made from their enemies—the contemporary representatives of the *Homo sapiens*."

The human remains from the Krapina rock shelter in northern Croatia have been described by the excavator, Gorjanović-Kramberger (1906, cited in Coon 1962: 508), as indicating cannibalism. Vallois (1961: 231) comments:

The rock shelter of Krapina is classically considered as having witnessed scenes of cannibalism; skulls, jaws, and the limb bones had been broken into such a number of fragments that accidental breakage could not have been involved. The human bones bore marks of cutting and some were partially burned and mixed in with animal bones that were also burned. The opinion of Gorjanović-Kramberger (1906) that these are the remains of cannibals' meals is unanimously accepted.

Hrdlička (1930: 206) agrees with this interpretation and adds that one specimen, a portion of the supra-orbital part of a frontal, shows some cuts. Coon (1962: 508) is more reserved, saying, "some of the bones were charred, and it has been claimed but not proved that some of the deceased were the victims of cannibalism."

No specific evidence suggesting intrahuman killing (for example, depressed fractures) was found, but the mixture of very fragmentary human bones with animal bones does seem to suggest a massacre and cannibalism (Vallois 1961: 228).

The tool industry from Krapina is Mousterian but includes both Acheulean and pre-Aurignacian elements. Brodar (1938, cited by Coon 1962: 508) classifies the most common implements as blades. According to Coon (1962: 509):

Even if the flints come from more than one level, the fact that implements of so many types come from one cave in Croatia occupied during the latter half of the Last Interglacial indicates either a gathering of different peoples or cultural evolution in process, or both. We need more evidence to decide.

Concerning the possible presence of different hominid species in northern Yugoslavia during the Third Interglacial, Škerlj (1958) comments:

Not far from Krapina, only 9 km. west of the center of Zagreb, in the Veternice cave, M. Malez discovered in 1955 a skull of modern features (*Homo sapiens*) together with a Mousterian implement in a stratum which speaks for the second half of the Riss-Würm interglacial. . . . Were there only Neanderthals in Krapina and its surroundings? It seems possible that another proof of the co-existence of Neanderthals and *Homo sapiens* during the last Interglacial period will come to our knowledge as soon as all circumstances have been reconsidered and the most important material of Veternice—particularly its stratigraphy—has been fully examined.

Brothwell (1961: 158–59) mentions the above find at Veternice as well as a skull from the Niah Cave in Borneo—the latter well within the *H. sapiens* range morphologically and dated by radiocarbon to $41,500 \pm 1,000$ years ago (GRO-1338) (Harrisson 1959: 137)—as evidence that *H. sapiens* in the Pleistocene may be represented by other than a blade industry.

In summing up the pre-Würm I fossils, the diversity of skeletal as well as tool types, especially during the Last Interglacial, the uncertainty as to the taxonomic positions of these fossil hominids, and the general sparseness of remains and other data make it impossible to know whether we are witnessing intraspecific violence, if indeed the depressed fractures and other evidences noted above are actual indications of purposeful killing.

“NEANDERTHALS”

Human skeletal material from the Würm I glacial and the early part of the Würm I/II interstadial is divided into two groups: the classic Neanderthal, found in southwestern Europe, and the “progressive” Neanderthal, found in Eastern Europe, Russia, and Southwest Asia. These two groups were contemporary but probably separated from each other by the ice sheets and loess (Howell 1958; Higgs and Brothwell 1961).

TABLE 4
WÜRM I–EARLY WÜRM I/II “NEANDERTHAL” REMAINS (CRANIAL)

SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Neanderthal (Germany)	calva and post cranial bones		
Engis (Belgium)	a) baby skull, fragmentary		
Spy (Belgium)	a) calotte		
La Chaise (France)	a) calva b) parietal		
La Chapelle-aux-Saints (France)	adult male skeleton		
La Ferrassie (France)	a) adult male skeleton b) adult female skeleton c–f) infants		
Le Moustier (France)	complete male skeleton		
Pech de l’Azé (France)	cranium of child (5–6 years)		
La Quina (France)	about 12 individuals including: a) adult female skeleton b) calva		
La Cotte de St. Brelade (Isle of Jers.)	a) child’s skull, fragmentary		

TABLE 4 *continued*

SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Monte Circeo (Italy)	a) adult male cranium	Blanc 1961:128; supported by Weidenreich 1943:190; Breuil and Lantier 1965:234-35	
Subalyuk (Hungary)	b) 6-year-old cranium broken into many parts		
Starosel'ye (U.S.S.R.)	child's skull (18 mos.)		
Teshik-Task (U.S.S.R.)	child's skeleton (8-10 yrs.)		
Shanidar (Iraq)	6 adult skeletons (I-VI) 1 infant skeleton	Stewart 1958:476; supported by Coon 1962:563; Solecki 1959:627	
Mugharet al-Tabun (Palestine)	a) adult female skeleton		
Mugharet al-Zuttiya (Palestine)	1 fragmentary cranium		
Mugharet al-Skhul (Palestine)	fragmentary remains of 9 adult skeletons (II-X) 1 child's skeleton, 3 years old (I)	McCown and Keith 1939:373; supported by Bergounioux 1958:158	
Djebel Qafzeh (Palestine)	fragmentary remains of 5 adults, 1 child		
Amud Cave (Palestine)	1 nearly complete skeleton		
Ksar 'Akil (Lebanon)	1 child's skeleton		
Broken Hill (Africa)	1 cranium	Keith 1928:418; supported by Yearsley 1928, Courville 1950	
Ngandong (Java)	11 crania (fragmentary)	von Koenigswald 1937:31; Coon 1962:391; supported by Bergounioux 1958:153	

Cranial remains of classic Neanderthals come from 11 sites and represent about 15 individuals. Evidence suggestive of purposeful violence is associated with one of these individuals, La Ferrassie (*a*), and a specific assertion of death by violence has been made with regard to another, the Monte Circeo skull (see Table 4).

Of the La Ferrassie skull, Courville (1950) has said that photographs show "faint linear markings that may indicate antemortem fracture lines." Coon (1962: 532-33) points out that the nasal bones are missing and that the skull "bears scars suggesting post-mortem surgery"; he concludes that the brain had been "teased out through the resulting aperture." The case for purposeful violence might be strengthened by evidence of unintentional burial, but here the evidence is equivocal. It was

originally argued that two of the infants found in the cave were purposefully buried (see Bergounioux 1958: 151). Hrdlička (1930:274-75) judged that the third infant had also been buried, and Capitan and Peyrony believed that the bodies of the adult male and female had been covered with skins and branches. Boule (1923: 190) was of a different opinion; he wrote that the remains at La Ferrassie were those "of a whole family, killed by accident, perhaps beneath a land slip." Keith (1928: 170) maintained that there was no sign of burial but that the individuals "were not entombed by natural means." Whether La Ferrassie No. 1, the adult male, was covered with skins and branches by his kin after a natural death, or left where he lay by cannibals after they had eaten his brain, cannot be determined on the basis of the evidence.

The Monte Circeo skull, found lying exposed on a Mousterian level of a cave inaccessible for more than 50,000 years (Vallois and Boule 1957: 211), is described by Blanc (1961: 124) as follows:

The Monte Circeo skull, representing a late or typical Neanderthal of La Chapelle-aux-Saints or Neanderthal form, about the age of forty-five at death, was lying on the floor of a cave surrounded by a circle of stones. The skull bears two mutilations: one caused by one or more violent blows on the right temporal region that has caused conspicuous damage to the frontal, the temporal, and the zygoma. This mutilation points to a violent death, probably a ritual murder. The other mutilation consists of the careful and symmetric incising of the periphery of the foramen magnum (which has been completely destroyed) and the subsequent artificial production of a sub-circular opening about 10–12 centimeters in diameter.

Blanc concludes that the victim must have been beheaded and the foramen magnum enlarged outside the cave because there was no trace of the rest of the skeleton or fragments of the mutilated base inside the cave where the skull was found “*in situ* on the Mousterian floor of the cave, not covered by sediment.”

Breuil and Lantier (1965: 234–35), exponents of the two-stage burial ritual, agree with the interpretation of purposeful violence espoused by Blanc for the Circeo skull, and Weidenreich (1943: 190) was led by the evidence to state that “the skulls of Ehringsdorf and Monte Circeo prove that the practice of man to war against his own kin is very old.”

Ten sites have yielded cranial remains, representing approximately 30 individuals, of “progressive” Neanderthals. At two of the sites, Shanidar and Skhül, there appear to be indications of purposeful violence.⁴

At Shanidar, in Iraqi Kurdistan, Solecki discovered six adult skeletons and one infant skeleton. Two of the adult skeletons (probably male) bear signs of having been injured, although their actual deaths were almost certainly caused by rocks falling from the roof of the cave (Solecki 1959). With reference to the individual called Shanidar I, Stewart (1958: 476) states:

The Shanidar I skull shows signs of having been asymmetrical antemortem. The signs are in the form of scars and indicate that this individual suffered injuries about the face and forehead. The location of the scars on the forepart of the head suggest injuries received in combat.

Shanidar III had had a blade stuck between two of his ribs (Solecki 1959: 627, citing Stewart in a lecture at the Smithsonian Institution). This did not cause his death, however, as there had been some healing of the bone. Solecki (p. 627) surmises:

Presumably Shanidar III had been disabled in a conflict with unfriendly neighbors and was recuperating when he was killed by a rockfall.

The radiocarbon date for Shanidar I is *ca.* 46,000 years (GRO-2527), and Shanidar III is perhaps a few hundred years older (p. 629).

⁴ The individual called “Galilee Man” from the Near Eastern site of Zuttiya exhibited three depressions on the frontal bone (Keith 1931: 185). The injuries represented by these depressions had healed before the individual’s death. Two of the sites of injury showed signs of past inflammation, but “whether the inflammation was the result of blows or of some disease, such as yaws, cannot be determined” (Keith 1931: 186). The date of the Galilee skull is uncertain but probably lies around the beginning of Würm I (Coon 1962: 566).

In a terrace outside the Skhül cave on Mt. Carmel, in Palestine, were found the skeletons of nine adults and one child. The remains of one of the adults (Skhül IX) and of the child exhibit wounds. The child’s injuries consist of a rectangular perforation and fracture of the right ear and glenoid cavity such as might have been caused by a sharp pointed stone or implement (Garrod and Bate 1937: 98). McCown and Keith (1939: 309) comment:

The bone had been the subject of violence soon after burial—or perhaps before—but whether deliberately or accidentally done, we cannot now decide.

Of Skhül IX, McCown and Keith (1939: 373) state:

A wound of the left hip joint gives unequivocal testimony to their possession of spear-like weapons . . . the injury was caused at death or soon after. . . . The skull of the same man shows extensive injury. A close examination of the margins of the injury leads us to think that it was caused by a glancing blow at, or soon after, death. The evidence in this case is not unequivocal.

Unless they were involved in hunting accidents, Shanidar III and Skhül IX would seem to have been victims of purposeful violence, and perhaps Shanidar I and the Skhül child also. Intraspecific aggression cannot be definitely assumed, however, because of the fact that Neanderthaloids and *H. sapiens* may have been living in the same area contemporaneously.

The Skhül remains probably date to about 10,000 years after Shanidar I and III—or *ca.* 36,000 B.C.⁵—and Brothwell (1961: 159) has concluded that they are representatives of *H. sapiens* which came into Palestine at about that time:

It now seems more likely that the Skhül series marks the replacement (no doubt gradually) of the Palestinian Neanderthals by an early true *sapiens* form, perhaps as early as 37,000 B.C. The similarity of the Skhül and Djebel Kafzeh types, already noted by Clark and Howell, 1958, further strengthens the conception of a well-defined incoming group to Palestine.

Neanderthaloid remains, assigned to some time in the Upper Pleistocene, have also been found in Rhodesia and Java (Clark 1947; Vallois and Boule 1957: 398). The remains of Rhodesian Man, found by a workman in the Broken Hill Mine, northern Rhodesia, in 1921, include a nearly complete cranium with two holes on the left temporal bone. Yearsley (1928) reported on the pathology of this bone. He concluded that the individual had died of an abscess originally caused by “the chronic septic condition of the mouth” and that one of the perforations was caused by “a wound inflicted by some sharp instrument during life and was not the cause of death.” Keith’s (1928: 418) interpretation of the demise of Rhodesian Man lays more stress on side effects of the wound:

Some considerable time before his death Rhodesian man received a severe wound, one inch above and in front of his left ear passage. The blow must have been given by a hard, sharp-pointed implement which left a perforation of the skull about

⁵ Tabun I and II are probably contemporary with Shanidar I and III, judging by their skeletal type (Solecki 1959)—perhaps predating the Skhül remains by 10,000 years (Higgs and Brothwell 1961).

one quarter of an inch in diameter (6 mm. by 7 mm.). The edge of the wound is healed and the undercutting of the margin shows that the implement had been driven from without inwards. Certain trails on the surface of the adjacent bone suggests that pus had formed and tracked in several directions. There is a peculiar erosion on the hinder wall of the left ear passage, large enough to take the terminal joint of a man's little finger. This eroded hole is of obscure origin, but may have been caused by an abscess which tracked behind the ear from the wound in the skull. The punctured wound lay over the second convolution of the temporal lobe. As already said, the victim lived sufficiently long to allow smoothing and healing of the edges of the bony wound.

What caused the puncture wound in the skull of Rhodesian Man, is, of course, not known.

In trying to relate the skeletal remains to a culture period, Clark (1947: 30) came to the conclusion that it would not be inconsistent to associate the cranium of Rhodesian Man with a developed Levallois or proto-Stillbay form of lithic industry. Bone implements and spherical "bolas" stones are believed to have been made by Rhodesian Man as well as Solo Man.

On a level 20 meters above the Solo River, near Ngandong, Java, C. ter Haar discovered the fragments of 11 Neanderthaloid skulls and more than 2,000 animal bones. Von Koenigswald (1937: 31) described the find as follows:

Of Ngandong man, only fragments of skulls and two tibiae have been discovered, while all skeletal parts of the different animals associated with him have been found. All the skulls have the facial parts missing and only two have a complete occipital region (Nos. VI and XI). A comparison with a skull, opened by living head-hunters for the purpose of eating the brain (Dajak, Central Borneo), provides an explanation: Ngandong skulls, too, were opened by man. Ngandong V shows clearly that this man was killed by a blow on the back of the head. In this manner we can explain the strange condition in which the human remains of the Ngandong site were found.

Hypothesizing that the 11 Neanderthaloid individuals were killed in order to be eaten, von Koenigswald refers to the depressed fracture on the back of the head of No. V to prove his claim. Coon (1962: 391) adds to the specific assertions of purposeful violence by listing scars on the Ngandong series which he believes were caused by wounds received in previous conflict situations prior to their deaths.

That a thick skull had a survival value in Soloese days is suggested by the roster of bone injuries in this series. Wholly aside from post-mortem mutilations, scars left from nonfatal battles are prevalent. On S-4 a large lesion shows where a heavy, and probably also sharp, implement pierced the scalp and outer bone table. The lesion healed. S-6 bears a similar scar. S-1 and S-10 each carried to death a square injury in which the diploe had been laid bare. S-1 also showed additional minor scars. All four heavily battle-scarred victims are called females and at least two of them must have been injured while young, because they died young. Their social life seems to have been active, and S-1 may have been particularly popular.

As with all the other injuries which appear to be purposeful in the Lower and Middle Palaeolithic, the identity of the attackers is not known. In all the instances cited with regard to Neanderthaloids, however, the slayers must either have been other Neanderthaloids (in which case intraspecific killing can be claimed) or *H. sapiens*.

In the Lower and Middle Palaeolithic there are relatively few remains, and because of the preoccupation of physical anthropologists with seeking the route and/or routes whereby *H. sapiens* arrived on the scene, each "find" stimulates interest and controversy which results in a substantial body of literature. The remains of *H. sapiens*, although of importance to those studying the problem of race, in general appear to stimulate less interest. For example, of the approximately 160 sites where *H. sapiens* remains have been found in Europe, Russia, and the Near East, the skeletal material from little more than 25 sites has been adequately described in publication (Coon 1962: 582). In addition, quite a few *H. sapiens* representatives of the Upper Palaeolithic were discovered in the early days of archaeology, when excavation techniques were often lax, to say the least. Therefore the dating of the remains has been questioned. Vallois and Boule (1957: 272) lament:

Discoveries of human bone-remains attributed to the Reindeer Age are numbered in hundreds. Unfortunately, most of them were accompanied by inexact observations leading to errors of attribution, or consist of evidence of no value for scientific study. The list of accurately dated finds that furnished material really worthy of serious study is a great deal shorter.

Reliable evidence of *H. sapiens* from the Upper Pleistocene has been found at 39 sites (Coon 1962: 430, 580, 612). Claims of purposeful violence have been made with regard to three of these—the Upper Cave at Choukoutien, China; Cro-Magnon, France; and Afalou-bou-Rhummel, Algeria (Table 5).⁶ Depressed fractures on human cranial remains have been discovered at three other locations—Chancelade, Oberkassel, and Laugerie-Basse. A claim of purposeful violence has been made only with reference to the first of these; Courville (1950) has suggested that the extensive cicatrized fracture on the right temporal was caused by a narrow-bladed blunt weapon. Sollas (1927: 94), on the other hand, who examined the skull, believes that the wound was due to an accidental fall. One of the skulls from Oberkassel is said to bear evidence of a wound on the right parietal that the victim survived (Verworn, Bonnet, and Steinman 1919: 625, cited by Courville 1950), but there has been no suggestion as to what caused the wound. Cranium 4 from Laugerie-Basse shows what is probably a depressed fracture in the left temporal fossa (Courville 1950); Massénet, Lalande, and Cartailhac (1872, cited in Vallois and Boule 1957: 274) believed the individual was killed by a rockfall as he lay asleep, but Vallois and Boule (1957: 274) say that this hypothesis cannot be accepted without reservations. Besides all this, there are several sites at which the material is in such disarray as to suggest that something out of the ordinary happened there. Two prime examples of this are Aveline's Hole, England,

⁶ The dating of the remains from Afalou-bou-Rhummel is in dispute. The lithic industry associated with the skeletal remains is Oranian (Ibéro-Maurusian), and Vallois (personal communication, September, 1968) believes that the Ibéro-Maurusian is not Palaeolithic, but Mesolithic. Balout (1967: 867) has said, however, that "at present, the 'Oranian' falls within the *Epipaléolithique*, but soon it will have to go back partially into the Upper Palaeolithic on the basis of new C¹⁴ dates." Oakley (1964: 322) classifies the Afalou-bou-Rhummel rock shelter as "Late Pleistocene or Holocene." I have included the remains in my survey because they are, if not Late Pleistocene, at least very close to the Pleistocene/Holocene boundary.

TABLE 5
LATE PLEISTOCENE CRANIAL REMAINS—HOMO SAPIENS

SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Brno (Czechoslovakia)	a) calva (M—juvenile) b) calvaria (M) c) complete cranium (F)		
Předmostí (Czechoslovakia)	remains of over 20 individuals (collective grave in form of ellipse and several other isolated burials)		
Dolní Věstonice (Czechoslovakia)	remains of 10 individuals		
Mladeč (Czechoslovakia)	remains of 6 individuals and many additional remains		
Aveline's Hole (England)	remains of 20 individuals including 4 calvaria (mostly women and/or youths)		
Gough's Cave (England)	1903: 1 skeleton (M) "Cheddar Man" 1928: 2 calvaria (adult and child of 3 yrs.), remains of 3 other individuals		
Oberkassel (Germany)	2 adult skeletons (M and F)		
Stettin (Germany)	2 calvaria		
Abri Pataud (France)	a) cranium of sub-adult b) cranium and fragmen- tary remains of new born infant c) humerus, radius d) fragmentary remains of child (3–5 yrs.) e) fragmentary remains of adult		
Bruniquel (France)	6 crania		
Cap Blanc (France)	1 complete skeleton (F)		
Chancelade (France)	1 skeleton (M)	Courville 1950	Sollas 1927:94
Combe-Capelle (France)	1 skeleton (M)		
Cro-Magnon (France)	a) cranium "old man" b) calvaria adult (F) c) calotte (M) remains of 2 other adults and children	Lartet and Christy 1875:70, as quoted by Munro 1912:130; supported by Wilson 1901:513; Courville 1950; Osborn 1922:291	
Duruthy (France)	1 calotte		

TABLE 5 *continued*

SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Les Hoteaux (France)	1 complete skeleton		
Laugerie-Basse (France)	a) calotte b) calotte c) calotte d) cranium		
Le Placard (France)	remains of over 10 individuals (Solutrean and Magdalenian strata)		
La Madeline (France)	a) cranium b) skeleton of child		
Le Roc (France)	1 cranium (F) 1 cranium (M)		
St.-Germaine-la Rivière (France)	a) fragmentary calotte b) skeleton (F)		
Solutré (France)	about 15 of the skulls found in the early excavations may be Upper Palaeo- lithic in date but only 6 are fit for study. 1922-24: 3 adult and 3 children's skeletons found in Aurignacian stratum and seem to be contemporary with this stratum (Vallois and Boule 1957:272).		
Veyrier (France)	1916: 1 adult skeleton (probably Magdalenian) 1933-35: calvaria (F) (Magdalenian)		
Arena Candide (Italy)	a) skeleton of young man b) 5 crania and remains of 4 other individuals		
Grottes des Enfants (Italy)	a) skeleton (M) b) skeleton (F) Other remains from other caves		
Hotu Cave (Iran)	a) cranium (M) b) cranium (F) c) cranium (F) d, e) fragmentary remains		
Afalou-bou-Rhummel (Algeria)	Level III: skeleton of adult (M), # 28 skull of child		
	Level I: cranial remains of 42 adults, 9 sub-adults; 5 isolated mandibles	Arambourg 1935:23; supported by Wulsin 1941:139	Briggs 1955:6; Boule <i>et al.</i> 1935:183-86
Dar es-Sultan (Morocco)	remains of 4 individuals		

TABLE 5 *continued*

SITE	REMAINS	CLAIM OF VIOLENCE	COUNTER-ARGUMENT
Saldanha Bay (S. Africa)	1 calvaria		
Lake Eyasi (Tanganyika)	1 skull (fragmentary)		
Florisbad (Orange Free State)	fragment of a cranium		
Mapa ^a (China)	1 adult calvaria (fragmentary)		
Upper Cave Choukoutien (China)	# 101 calvaria (M) quite old # 102 calvaria (F) # 103 calvaria (F) 1 calotte (M) remains of child (5 yrs.) a newborn baby or foetus and an adolescent	Weidenreich 1939 <i>b</i> : 38; supported by Coon 1962: 473	Pei 1939: 38
Tze-Yang (China)	1 skull (F)		
Liu-Kiang (China)	1 cranium		
Niah Cave (N. Borneo)	1 skull (adolescent)		
Wadjak (Java)	2 nearly complete crania		

^a This site may be late Middle Pleistocene.

which is probably Upper Palaeolithic (Davies 1919–24), and the proto-Magdalenian level at Abri Pataud (Movius and Vallois 1959). There are apparently no specific claims, however, so these will not be discussed here.

The Upper Cave at Choukoutien has yielded the remains of seven individuals, the skulls of four of which show depressed fractures. Weidenreich (1939*a*: 162–63), who studied the skeletal material, argues for purposeful violence here as follows: (a) Although it appears that there was a “burial” in the cave, as evidenced by the quantity of hematite which was found in the earth surrounding the skeletons, this may have been a feigned burial of dismembered parts thrown into the cave of victims of a sudden attack. (b) The victims were probably a family who need not necessarily have lived in the cave but may have had their headquarters nearby or were in the process of migrating. Describing the lesions, Weidenreich (1939*b*: 38–40) notes that:

Of seven skulls four are suitable for diagnosis as to the cause of death. The first skull, that of an old man as mentioned above, displays a typical round depressed fracture on the left side above the temporal region. It must have been caused by a pointed implement. The second skull, probably that of a woman, shows a long and wide slit-like hole at the superior part of the left temporal region. This hole breaks through the wall of the skull from above downward giving the impression that it was caused by a spear-like implement piercing through the wall from

above. In addition, the entire skull is crushed into numerous smaller and larger fragments still in their natural connections. At least two centers are distinguishable from which these fragments radiate, indicating that the crushing was produced by heavy blows from club-like implements. The third skull is likewise fractured but not broken into such numerous fragments as in the second one. Also in this the fragments are in place in natural arrangement, the markings of the blows being located at the frontal region of the left side. The fourth skull consists of only the frontal and two parietal bones. Here the injuries are represented by a large fractured and deeply depressed area corresponding to the frontal sinus, the splinters of the outside are still in place and those of the inner side form a protruding elevation. Both parietal bones display a large fractured depression with a typically splint interior table. In this instance clubs and a more pointed weapon must have been used.

Weidenreich concludes that

there remains no doubt that the late Palaeolithic population of Choukoutien died a violent death which overtook the entire family including a newborn fetus, on the one hand, and a rather old man, on the other.

Pei's (1939: 38) approach to the interpretation of the human remains in the Upper Cave is based on the idea that the individuals were purposefully buried, their remains perhaps having been scattered by burrowing animals, such as the badger, of which there is evidence in the fill of the cave. Pei notes that two femora found in

association with one of the skulls exhibit marks of gnawing carnivores, later smoothed by water action. The depressed fractures on the skulls are attributed by him to possible rockfalls after burial but before decomposition, and he points out (p. 46) that the fractured parts of skulls nos. 101 and 102 are on the side facing the roof of the cave. According to the excavator, Pei:

My idea that the Cave should have served as a burial site somewhat conflicts with the theory of Dr. F. Weidenreich who is inclined to believe that all the human occupants of the Upper Cave had met with a violent death. Dr. Weidenreich's hypothesis is probably well based on the fact, which I had already pointed out to the late Dr. Davidson Black at the time of discovery, that the skulls, in addition to their later crushing in the sediments, show traces of local percussion evidently made at a time when they still contained most of the organic matter. But on the other hand, we must not forget the human remains were found in a cave where limestone blocks were constantly falling down from the roof. Under such circumstances, the possibility of the skulls having been smashed by the falling blocks shortly after their burial does not seem remote.

This more cautious interpretation of events in the Upper Cave must, of course, be considered; but Weidenreich's theory does appear to be well documented by the skeletal evidence.

The site called Cro-Magnon, a rock shelter originally covered by a talus 4–6 m. thick, has produced human remains described by Lartet (Lartet and Christy 1875: 70, cited by Munro 1912: 130) as follows:

As for the human remains and the position they occupied in the bed, the following are the results of my careful enquiries in the matter. At the back of the cave was found an old man's skull, which alone was on a level with the surface, in the cavity not filled up in the back of the cave, and was therefore exposed to the calcareous drip from the roof, as is shown by its having a stalagmitic coating on some parts. The other human bones, referable to four other skeletons, were found around the first, within a radius of about 1.50 meters. Among these bones were found on the left of the old man, the skeleton of a woman, whose skull presents in front a deep wound made by a cutting instrument, but which did not kill her at once, as the bone has been partly repaired within; indeed our physicians think she survived several weeks. By the side of the woman's skeleton was that of an infant which had not arrived at its full time of foetal development.

Broca made a study of the skeletal remains from this site. According to Wilson (1901: 514) and Courville (1950), Broca estimated, on the evidence of the healing around the wound, that the individual had lived for quite a while after the blow. Courville describes the incised wound as 5.0 cm. long and 1.5 cm. wide and states that it was located on the left frontal region.

The wound lies obliquely and presents some eversion of its edges, from which radiating cracks may be seen. From its size, it is clear that the dura and leptomeninges were penetrated and the brain wounded. The nature of the wound suggests that it was produced by the so-called "fist-ax," probably hafted in this case in order to deliver so powerful a blow.

Amidst the human remains were a large number of perforated marine shells probably used for necklaces, bracelets, or other ornamental attire. Vallois and Boule (1957: 273) have no doubt that the date of the human remains is Upper Palaeolithic and state that "the human

bones were grouped at the back of the shelter, in conditions suggestive of burial." The only other injury reported for the human remains at this site was a healed fracture of a male femur.

Afalou-bou-Rhummel is a rock shelter lying halfway up a high cliff that overlooks the Mediterranean. Its roof rises to a natural "chimney" leading to the plateau above. Directly under this chimney hole, the remains of over 50 individuals were found.

The level containing these remains is the uppermost of four stratigraphic levels. The bottom level was composed of red clay and found to be sterile. Above this sterile stratum was a level rich in Oranian (sometimes also called Mouillon or Ibéro-Maurusian) tools and animal bones. A full-length adult burial was found in this layer; the skull of a child lay at the feet of the adult, believed to have been a male. Above this burial in the same level was a thin layer of sterile red clay; Arambourg (1935: 22) suggests that after the burial the shelter may have become sacred. Level II contained Oranian tools, ashes, charcoal, shells, and animal bones.

Level I extended from 50 cm. below the surface to 4.40 m. below the surface. Between 3.25 and 4 m. below the surface, the large pile of human skeletal material was found. From 3.25 m. to 50 cm. or that part of Level I which was above the bone heap, there was well-stratified grey ash and pebbles containing horizontal streaks of charcoal which showed that it had not been disturbed. In other words, the bone remains were not the result of later burials but were contemporary with the strata in which they lay. Curiously, there was apparently no zone of separation between the archaeological level on which the pile of human bones resided and that covering it (Arambourg 1935: 23). A large fireplace of flat stones lay directly above the bones, and near it were the remains of mouflon. The stone industry continued to be Oranian. According to Briggs (1955: 6):

The industry of the surviving occupants of Level I (who seem to have gone about their daily eating undisturbed by the precipitate arrival in their midst of decomposing corpses) was Mouillon [Oranian].

Arambourg (1935: 22), the excavator, offers the following thoughts about the pile of human bones:⁷

The interpretation of the ossuary is difficult. . . if one examines the distribution of the remains one ascertains that they form a nearly circular heap the center of which corresponds directly to the chimney hole above in the vault of the shelter. It is a true pile up of remains executed without order in the middle of the

⁷ "L'interprétation de l'ossuaire du niveau supérieur est plus délicate. Il semble bien que la fouille ait mis à jour tous les assemblages que contenait cette partie de la grotte. Or, si l'on examine leur répartition (fig. 8), on constate que celle-ci forme une masse de contour à peu près circulaire, dont le centre correspond exactement à la projection horizontale de l'ouverture de la voûte. C'est un véritable entassement effectué sans ordre au milieu même de la grotte, et l'on peut se demander s'il n'existe pas une relation entre la situation de ce charnier et la cheminée de la voûte qui aurait pu servir à la précipitation des corps par cette voie.

Il est assez difficile, d'autre part, de déterminer s'il s'agit d'un lieu de sépulture commune ou d'un ossuaire—comparable à ceux de certaines peuplades actuelles—où les cadavres ne sont rassemblés qu'après exposition et décharnement au dehors. La diversité d'orientation des squelettes, leurs positions différentes et l'attitude contractée, comme recroquevillé de certains, peut suggérer une troisième hypothèse: celle du massacre en masse d'une tribu par une autre."

cave and a question may be raised concerning the relationship of the location of this ossuary to the funnel of the vault through which the bodies may have been thrown. It is rather difficult to determine if this is a communal burial place or a charnel-house—comparable to those of certain people of the present time—where the bodies are collected after exposure and decay outdoors. The diversity of orientation of the skeletal remains, their different positions and contracted attitude as if curled up, possibly suggests a third hypothesis: that of a massacre of one tribe by another.

Wulsin (1941: 139), a definite proponent of the massacre theory, states:

Arambourg suggested three alternative explanations: that we are dealing with a community burial; that the bones were reburied, after being deprived of flesh elsewhere; and that the pile is evidence of a massacre, whose victims were thrown down the chimney from above into the rock-shelter. The first two explanations hardly fit with the disorder in which the bodies lay, or the absence of many parts. The third will account for all the facts, especially if we suppose that the bodies were thrown down the chimney after they had lain for some time on the surface and had begun to disintegrate.

Briggs (1955: 6) cautions, however, against accepting the massacre theory by pointing out two factors: (1) There were several practically complete skeletons found in the midst of a mass of anatomically isolated bones. This seems to indicate that not all the subjects remained in the open for the same length of time after death. (2) No signs of mortal or even crippling wounds were found in the large number of human skeletal remains. This fact "greatly weakens the theory of a violent death for all."

The latter statement of Briggs concerning the absence of any indication of mortal wounds on the human remains of Level I at Afalou-bou-Rhummel is corroborated by the extensive report of Boule, Vallois, and Verneau (1935: 149, 183–86) on the pathological lesions of the skulls and postcranial remains. Nothing which could be interpreted as a fatal injury was noted. However, two skulls (Afalou 12 and 27) exhibited depressions which probably resulted from abscesses following wounds to the head. Healing of the bone indicated that the individuals had survived the injuries. Afalou 12 was also probably hit in the nose (Briggs 1955: 86):

Afalou 12 also suffered a blow on the nose that dislocated the nasal bone and broke off its most forward projecting extremity as well as that of the frontal process of the left maxilla. The dislocated and detached pieces remained in their new locations, in a depressed position, where they became reunited with each other and with adjacent bones. The blow that caused this damage must have been delivered from in front, at an angle of about 45° toward the victim's left, and the weapon may well have been a human fist although butting with the head, still a popular technique in our area, seems perhaps more likely.

Although the human skeletal material from Afalou-bou-Rhummel possibly provides the earliest evidence for a fist-fight, the bones themselves do not support a theory of massacre. Therefore, this site cannot be used as an example of warfare in the Upper Palaeolithic. A theory of plague or starvation could fit the evidence as well.

As far as can be deduced from the skeletal evidence, then, only two Upper Palaeolithic sites appear to have witnessed intrahuman killing: Cro-Magnon and the Upper Cave of Choukoutien.

EVIDENCE FROM UPPER PALAEOLITHIC CAVE ART

Human figures with arrows protruding from them are drawn on the walls of two French caves—Pech Merle (Cabrerets) and Cougnac, both in Lot. The paintings depicting intrahuman violence are all ascribed to the Aurignacian-Perigordian period (Breuil 1952: 272; Méroc and Mazet 1953: 494). However, the representations of the human form in the two caves are different, especially with regard to the head.

At Pech Merle, there is only one apparently wounded human being. Seven arrows stick out from the trunk of the man which Graziosi (1960: 182) describes as "a figure with rounded, polished cranium and pointed face." Breuil (1952: 272) states that, "a masked man with a pointed muzzle seems to be pierced by arrows, unless he is carrying them." Leroi-Gourhan (1965: 364) simply refers to the scene as "man pierced with arrows" (*homme percé de traits*).

Three separate drawings of human beings pierced with arrows occur at Cougnac. Two of the figures have faces which end in ducklike beaks. In the third figure, the upper trunk and face are missing. Méroc and Mazet (1953) have offered the following interpretation of the pierced men:

These representations are undoubtedly connected with magic and destruction. Up to the present time only animal figures have afforded numerous and undoubted examples of such practices. We now have proof that these rites were extended to our species. One can raise the question as to whether the officiating priests sought to obtain neutralization, "exorcism" according to Breuil, of malevolent spirits or the destruction of enemies in person. We are inclined toward the first hypothesis, more compatible than the second with the animal face of the individuals.

Graziosi (1960: 158) believes that the figures probably depict "killing magic":

This is the first obvious case in Franco-Cantabrian art in which a probable representation of "killing magic" appears in connection with human beings, unless the figures are to be considered commemorative.

He notes that a human figure which he saw in a photograph of a painting from the cave of Villars (Périgord) "somewhat recalls the anthropomorphic figures at Cougnac." If indeed the drawings at Cougnac were representations of enemies from a different region, not only intraspecific killing, but warfare, could be attested in the Upper Palaeolithic. However, the evidence is too indefinite to draw such a conclusion.

SUMMARY

In the Pleistocene era, claims of intraspecific killing are based primarily upon depressed fractures found on the

cranial remains of fossil men. Of 36 australopithecine individuals represented by cranial parts, 20 are said to have met their death due to intraspecific violence. Two of these claims are better documented than the others: (1) an *A. africanus* individual with a double depressed fracture on the right parietal, and (2) an *A. robustus* (*Paranthropus*) individual in whose skull a piece of rock was found imbedded.

Intraspecific killing has been argued with regard to the pithecanthropine (*H. erectus*) remains from East Asia. Of six pithecanthropine individuals from Java, it is suggested that one (No. IV) met his death due to a blow on the head. All of the pithecanthropine remains from the Lower Cave of Choukoutien, China, are said to represent the hunted repast of other pithecanthropines, although the only actual evidence for possible violence consists of depressed fractures on three skulls from a level which was practically barren of animal bones or worked stones.

In Europe for the period prior to the Würm I glaciation, cranial remains of approximately 25 individuals have been discovered, and claims of purposeful killing have been made with regard to 16 of them. Thirteen of these are believed to have been part of a cannibalistic feast at Krapina. The crania from Steinheim (Mindel/Riss Interglacial), Fontéchevade, and Ehringsdorf (both Riss/Würm Interglacial) exhibit depressed fractures; claims of violence have been made by at least one physical anthropologist for each of these skulls.

Human remains from southwestern Europe during Würm I and the Würm I/II interstadial represent some 15 individuals; an allegation of probable murder has been made with regard to one of these (Circeo). Of the approximately 30 individuals represented by remains from this period in Eastern Europe, Russia, and Southwest Asia, two (Shanidar III and Skhül IX) have post-cranial injuries that seem to indicate that spear-like weapons may have been used on man (unless, of course, the wounds were the result of hunting or other accidents). Shanidar I exhibits cranial injuries suggestive of combat. Rhodesian Man was wounded by a small, round, pointed implement in the left temporal. Several of the Neanderthaloid skull caps from Ngandong, Java, exhibit marks of

blows suggesting that they may have been purposefully killed.

With regard to *H. sapiens* material from the Upper Palaeolithic, representing well over 200 individuals, fairly substantial claims of purposeful killing have been made with regard to eight individuals, one from Cro-Magnon and seven from the Upper Cave at Choukoutien. For this period we have the additional evidence of cave paintings depicting human beings pierced with arrows at Pech Merle and Cougnac.

It is difficult to interpret the skeletal evidence. A depressed fracture may be caused by an accidental tumble or a block of stone falling from the roof of a cave as well as a weapon. The reader will have to decide for himself the extent to which the claims of purposeful violence are justified. Perhaps some will conclude that the only reliable evidence of intrahuman killing is the Upper Palaeolithic cave paintings from France. Further, since for most of the Pleistocene it is not known what different genera and species of hominid may have occupied the same general territory contemporaneously, the best of evidence pointing toward purposeful violence still does not demonstrate intraspecific killing, for the identity of the attacker remains unknown.

My own evaluation is that some intrahominid (perhaps intraspecific) killing probably occurred in the Lower and Middle Pleistocene and that sporadic intraspecific killing probably took place among *H. sapiens* in the Upper Palaeolithic. The evidence to back up the latter statement is the four skulls with depressed fractures from the Upper Cave of Choukoutien in China, the drawings of human figures pierced with arrows in two French caves, and probably the cut on the skull of the woman from Cro-Magnon. If some of the human skeletal material from Afalou-bou-Rhummel, Algeria, had exhibited mortal wounds, the contention that warfare occurred in the Upper Palaeolithic might be documented. The only other instance of possible mass killing in the Upper Palaeolithic is that of the Upper Cave of Choukoutien, and since Pei does not affirm Weidenreich's assertion that these remains were victims of a massacre it seems unwise to ascribe the term "warfare" to this situation.

Abstract

This review article is a compilation of the concrete data available from the Pleistocene that has bearing on the subject of intrahuman killing and warfare. The two main sources of evidence are cave paintings and the fossilized cranial remains of Pleistocene men, the latter providing more abundant information. The known cranial remains of australopithecines, *H. erectus*, Neanderthals (progressive and classic), and Pleistocene *H. sapiens* are surveyed here. Where this skeletal material shows signs of injury—notably, depressed fractures—specific assertions of purposeful human violence have sometimes been made; these claims, and the counter-arguments, are noted

briefly in the tables and discussed (along with the physical evidence upon which they were made) in the text.

Different genera as well as species of hominids may have been living in the same area contemporaneously during the greater portion of the Pleistocene; therefore it is difficult to cite instances of intraspecific killing even if the claims of violence are accepted. Because of the differences of opinion among specialists, the reader will have to decide for himself which of the various claims of violence is justified. The author's determination is that, although there seems to be sound evidence for sporadic intrahuman killing, the known data is not sufficient to document warfare.

Fossil australopithecids from Taung, Sterkfontein, Kromdraai, and Makapansgat (Dart 1949: 37-38)

A records nature of damage prior to fossilization; *B* gives estimated cause of damage.

1. *Australopithecus africanus*—Taung. Complete facial portion of the skull articulating with an endocranial cast, which filled virtually the whole right side of the cranial cavity (and part of the left side in the frontal and parietal regions), but is deficient for the remainder of the left side of the cranial cavity (and that portion of the base which intervenes between the pterygoid laminae and the foramen magnum). A piece of bone, approximately half an inch square, lies free on the lime-encrusted left surface of the cast, showing that the skull must have been sufficiently lacking on the left side to have allowed the entrance of this fragment into its cavity.

A. The coronal suture was sprung slightly to the right and left of the bregma. The irregularity of the cast in the left frontal region suggests that the bone suffered from a fracture laterally which extended posteriorly into this region. This supposition is consistent with the fact that the roof and lateral wall of the orbit was fractured. The left ramus of the mandible was broken and the right temporal bone has disappeared. Apparently the fossil, though very little if at all distorted, had suffered an extensive defect in the antero-lateral portion of its neural wall.

B. A lateral blow on the left fronto-temporal region of the skull.

2. *Plesianthropus transvaalensis* type 1. A fragmented skull (without mandible or much of face) and a fronto-parieto-temporal endocranial cast lacking the right parietal and occipital regions. The right maxilla, pro-maxilla and malar are fairly complete and a little crushed; the left maxilla is better preserved but less complete. The base and the vault are sufficiently preserved to yield accurate reconstruction of the general cranial dimensions.

A. The general volume and shape of the endocranial cast have been altered by compression. The squashing of the cast is maximal anteriorly and the temporal height is estimated to be reduced by at least 1 cm. by the left temporal bone overriding the parietal at their suture. The left temporal lobe tip was absent from the cast. Crushing and distortion is evident also in the chiasmatic and inferior frontal regions. The left temporal bone was so damaged that it was removed piecemeal.

B. A lateral blow on the left temporo-parietal region of the skull.

3. *Plesianthropus transvaalensis* type 2. Fronto-parieto-temporal endocranial cast. Left fronto-parietal region deficient and occipital region and base entirely absent. The frontal portion of the sagittal sutural line has been deflected more than 15 degrees to the right of the parietal portion of the sagittal suture.

A. The bregmatic angles of both parietal bones are the seat of two depressed fractures in the right parietal bone that hinge together on each side of an irregular line; the left margin of the fractured area follows roughly the sagittal suture. The lateral margins of the area are depressed: the right 12 mm. and the left 4 mm. below the

remainder of the parietal bones. Running across these broken fragments and the frontal bones run radiating fracture lines to the left and right lateral orbital margins both of which were fractured transversely. Owing to the great distortion in the right Sylvian notch region the temporal bone overrode the parietal for a centimeter.

B. A vertical blow just behind and to the right of the bregma with a double-headed object.

4. *Plesianthropus transvaalensis* type 3. Parieto-occipital endocranial cast fractured (in blasting) horizontally through the occipital poles and coronally through the parietal region in the vicinity of the vertex.

A. Fragments of bone in the substance of the cast show that the skull must have been open in some region or other (as in the Taung specimen). The sagittal and lambdoid sutures have been sprung. In addition to minor fracture lines a major line of fracture runs completely across the cast through the parietal regions and skirting the anterior margin of the right parietal area fragment. The postero-medial portion of the left parietal area at the sagittal suture and even more deeply below the antero-lateral portion of the bone both anteriorly and laterally.

B. A vertical blow slightly to the left of mid-parietal region with a bludgeon.

5. *Paranthropus robustus*. Side of upper face, zygomatic arch, sphenoid, temporal, and portion of occipital bones of the left side and a plaster endocranial cast of the interior of the preserved portions.

A. Left parietal bone crushed into floor of skull under piece of stone (?dolomite).

B. Vertical blow in the left parietal region with a rock.

6. *Australopithecus prometheus*. Occiput exhibiting major portion of occipital bone and posterior third of each parietal bone. Margins of bones jagged.

A. Separation from remainder by transverse shattering of the vertex and avulsion of the front and rear halves of the skull.

B. A severing transverse blow with bludgeon on the vertex and tearing apart of the front and back halves of the broken skull.

APPENDIX B

Injuries of Skulls X, XI, and XII from Choukoutien, Location 1, Level 25 (Weidenreich 1943: 188-90)

Skull X. (a) . . . a deep and long depression on the left side of the frontal and parietal bones that runs almost parallel to the sagittal suture . . . the depression begins near the vertex, crosses the coronal suture and ends halfway down the frontal squama on a broad fissure apparently of a later accidental provenance . . . the fact can be adduced that the injury of Skull X is not fresh, the surface being completely smooth and looking like an old scar. Therefore the skull was struck, not after death, but when the individual was alive; the individual must have survived the blow. (b) . . . a further depressed fracture of much smaller dimensions than that of the left side. This depression is circular, its diameter amounting to about

20 mm., and situated almost on the mid-line a little behind the vertex, mainly on the right side and affecting the sagittal margin of the left parietal bone. In figures 50 and 56 the injury is recognizable. In this case the interior table is broken around an oval line and projects into the cavity. Although the surface of the fracture is smooth, I doubt that this injury can be regarded as a healed lesion.

Skull XI. Skull XI shows two injuries the nature of which is easier to understand. They concern the parietal bones on either side. The left bone exhibits a typically semi-circular, depressed fracture with fairly sharp borders situated just behind the vertex of the parietal tuberosity and at the edge of a large irregular defect which extends over the superior and posterior parts of the bone. This fracture is apparently the result of a heavy blow breaking the bone into smaller pieces along the transverse line that crosses the depressed area. The pieces are missing and could not be recognized among those found in the place where the skull was recovered.

The second injury occupies an almost identical place on the right side. The only difference is that the depressed area appears shallower, nor were the parts of the parietal bone lost. They were recovered and used for the restoration. But it is evident that the depressed area represents a center from which three fissures start: one running backwards, one medially and one laterally, the two latter following the same straight line. In the first injury the inner side is broken away; in the second it is in place but does not show particular fracturing, except for a slight prominence of the broken pieces which boarded the transverse fissure.

Skull XII. In the case of Skull XII the surface of the cut is slightly rough and there is a distinct knob-like prominence of the interior table but no splintering. The thickness of the bone may have proven a good protection. In Skull XII there is also a scar of smaller dimensions on the left side of the forehead; in this case the surface is less smooth, nevertheless the injury looks more like a scar than a wound.

Comments

by VIJENDER BHALLA☆

Chandigarh, India. 20 IV 68

The subject of intrahuman killing during the Pleistocene is interesting and thought-provoking. The laborious task of putting together the bits of information on the subject scattered here and there has been skillfully accomplished by the author and the issue tackled despite the obstacles of insufficient fossil material, opposing viewpoints, and taxonomic lacunae. Notwithstanding differences of opinion on isolated issues, the author's conclusion seems justified. The issue has important bearings on certain faculties of brain; I propose to discuss these here.

Every action, whether it is overt instinctive behaviour or the result of so-called higher mental functions such as conscious contemplative thinking, reasoning, etc., is simply a muscular reflex, the explicit response to specific environmental stimuli. The nature of the response, however, tends to differ in different animals and is a function of interneuron activities in the brain. While the behaviour of most animals is based on an inherited, instinctive stored programme of activity, in comparatively large-brained animals it is determined partly by inborn circuits of interneurons (hence instinctive) and partly by interneurons capable of establishing new circuits, which account for such complex facets of human behaviour as learning through experience, memory storage, and correlation of information—in short, contemplative thinking. It is this faculty which, in my opinion, distinguishes fundamentally the type of intraspecific killing evidenced in man from that reported in other mammals.

In the opening sentence of her article, Roper contends that "man, alone, of the class Mammalia engages in intraspecific warfare" and that "even isolated killing between members of the same species [other than man] is rare." It will not be out of place to quote here a series of observations made by Zuckerman (1932) on intraspecific killing in a colony of hamadryas baboons. The colony was started in 1925 with 100 baboons at the London Zoological Garden, under conditions that reproduced their natural environment as closely as possible. The stock was augmented from time to time by new additions, primarily of females. Some of the observations made by Zuckerman (1932: 219–20) are as follows:

In 1926 two males and a female were killed by their fellows. . . .

Early in 1927 the stock was further depleted by the death of six males and of one female who was killed by her companions.

[With the arrival of a new batch of females], all the old males tried to secure females, fifteen of whom were killed. . . .

The males fight for the females who are usually fatally injured in the mêlée which rages around them.

During the year (1930) three males died and four females were killed. Eight males in all died from injuries received in fights, and fifty-three from disease. . . . Of the thirty-three females that died, thirty lost their lives in fights, in which they were the prizes fought for by the males.

The reason ascribed to the large number of killing incidents in the London colony of baboons is social discord, which was augmented whenever a new stock of females arrived. Zuckerman has very aptly analysed the situation as follows (p. 222):

The equilibrium of a social group is dependent upon the mutual reactions of all its

members. The death of any single individual upsets the state of balance and fighting commonly breaks out before a new equilibrium is reached.

This explanation allows for the possibility of killing under natural conditions as well. Surely such situations must also arise under natural conditions, though here the incidence of killing would not be expected to be very high because the loser can escape from the aggressor, an alternative denied to him in captivity.

It seems reasonable to assume that even if killing between members of the same species is rare under natural conditions, a predisposition to kill is not wanting in the subhuman mammals. It manifests itself whenever they are exposed to situations that stimulate aggressive behaviour. Social disruption is conducive to such states of mind as intense anger, desire for vengeance, jealousy, self-protection, etc., any of which may culminate in violence. The result of this violence need not, however, be fatal, for the impulses arising in such a state of mind are not directed toward causing death. It is well-known that baboons have no appreciation of death. They react to their dead companions as if the latter were alive but passive. Obviously, then, the intention in a fight is merely to inflict pain, to threaten and scare away the opponent. No contemplative thinking seems to be involved. It is merely an automatic locomotor response of the type called "animal tropism," aroused by an impulse of a certain kind. The action is not the result of any intelligent apprehension of the nature of the situation, but a spontaneous response to the stimulus. If death occurs, it is only incidental. On the contrary, in man the violent action is related, more often than not, to a faculty of mind called

memory. The response in this case is not "blind"; it emanates from contemplative thinking. Here, then, lies the fundamental difference between intraspecific killing in man and in the sub-human mammals.

In dealing with the subject of intra-specific killing in early man, this distinction must be kept in mind. Unless cannibalism is indicated, and unless the brain size significantly exceeds anthropoid proportions, intraspecific killing should be regarded not as an act of intelligent apprehension of, but as a blind response to, such situations as appear during phases of social rearrangement. Rensch and Altevogt (1955) compared the learning abilities of a number of related animal species of contrasting body and brain size and concluded that memory is about proportional to brain size. The nearest kin of man, i.e., anthropoid apes, have about $\frac{1}{3}$ of the cranial capacity of man. By Rensch's analogy, the intelligent apprehension of events is probably not very well developed in them. If and when killing does occur among them, it cannot be regarded as controlled behaviour. The situation is not much different in australopithecines. At this stage of evolution the cranial capacity is not much greater than in the anthropoid apes, and neither are the cerebral hemispheres, which not only bear the modulator centres for most motor and sensory activities, but also are the seat of memory, intelligence, and all so-called higher mental functions. Intraspecific killing in australopithecines, if and when established, will probably not differ very much in character from that observed in living human primates. True overt fighting resulting in the death of loser appears only at a stage in which the brain has achieved the more sophisticated type of modulator activity manifested in contemplative thinking. It is a behaviour unique to man and was perhaps acquired sometime during the transitory phase of evolution from the *Australopithecus* stage to the *Pithecanthropus* stage. Thus "intraspecific killing" is of more than incidental significance only in the genus *Homo*.

by C. LORING BRACE*

Ann Arbor, Mich., U.S.A. 11 III 69

There is a curious futility about Roper's undertaking. Not that a survey of injuries, evident or attributed, in the remains of prehistoric humans would not be of value if it were complete or accurate; but this one is only a partial catalogue of phenomena assembled without regard to whether or not any light could be cast on the question which inspired it, and as such it is of little use to specialists and of no value to a general anthropological readership.

If indeed the author had seriously anticipated using evidence for cranial injuries to indicate anything about intraspecific killing, at the very least she should have made some effort to review the skeletal evidence where warfare or other homicidal activity is in fact known to have caused death. Considering the abundance of such activities in the recent past, this should not have been difficult to do. In the absence of such a survey, I can make the claim without fear of contradiction that the vast majority of lethal behavior practiced by man against man has left no enduring trace whatever upon the preservable portions of the skeleton. And if the majority of instances of intraspecific killing will have left not a trace of injury to the skull, it is equally true that the majority of cranial wounds will have been caused by other than human agency.

Consequently, a list of cranial injuries is simply a list of cranial injuries. In this particular case, the list is neither complete nor accurate; it is not based on an actual examination of the specimens, nor even on a thorough familiarity with the primary sources. Furthermore, when secondary sources are cited, as they frequently are, no assessment is made of their credibility, nor is there any concern for the criteria necessary for such an assessment.

A complete consideration of the evidence obviously would take more space than is practical for even a long review article. This being the case, some principle for selection should have been stated and followed. None is mentioned, and from the context it would appear that choice was dictated more by caprice than design. For example, if depressed cranial fractures were the focus of concern, why were the headless specimens from Sidi Abderrahman and Heidelberg mentioned and the crania from Lantian and Vértesszöllös omitted from the pithecanthropine list? For the Neanderthals, why was no mention made of the half-century of controversy relating to the original specimen and concerning cranial and postcranial injuries (Schaafhausen 1857:51, 1861:157; Busk 1861:173; Virchow 1872:158, 161; Schwalbe 1901:12, 19)? Why also were the Gibraltar skulls omitted? Why was only one of the Spy skeletons mentioned and that enigmatically referred to as a "calotte"? What is the justification for referring to St. Brelade as "child's skull, fragmentary" and making no mention of the adult dentition to which the name was originally given? Why is there no mention of Jebel Irhoud and Petralona, among others? For the Upper Palaeolithic also, important specimens (Barma Grande and others) are not mentioned

while trivial or doubtful ones are included.

This raises the question of dating. Kromdraai and Swartkrans are called "probably early Middle Pleistocene," an assessment which was made by faunal comparisons with East Africa before K/Ar dating pushed Olduvai back in time a million years (note the subsequent cautions and tentative reassessments by Cook 1963:103 and Ewer 1967:118). Krapina is called pre-Würm without any reference to the published evidence that it is more recent (Guenther 1959; Oakley 1965:281). The Solutré finds are considered "Upper Palaeolithic" without mention of their recent disqualification (de Sonneville-Bordes 1959:19; Smith 1966:373). Saldanha and Eyassi are included without qualification or apology in the list of late Pleistocene *H. sapiens*, although reference to the more recent major secondary sources (for instance, Coon 1962) should have given pause.

More serious than either the capriciousness of specimen selection or the liberties taken with dating is the complete absence of any assessment of problems in taxonomy and the taxonomic affiliation of hominid skeletal material. Roper makes the claim—without benefit of proof, discussion, or citations—that the existence of no more than one hominid species cannot be determined until the end of the Würm I/II interstadial. If indeed this is the case, then what purpose can be served by an incomplete and inaccurate review of earlier material? While certainty in identifying the affiliation of prehistoric skeletal material can never be more than a probability statement at best, this hardly warrants the total lack of concern for the principles of taxonomy exhibited here. At least eight species and possibly five genera are used in text and tables which are not acceptable to the majority of serious students of human evolution at the present time, and some attributions are made (for instance, Olduvai hominids 14 and 16) which are unique and original (yet others which have been made are not included). While there is nothing to prevent a scholar from revising previous classifications (cf. comments by Campbell 1965:27), the names included here are presented in formal italicized form without citations or discussion. Hominid taxonomic assessment is an important issue which has been the subject of continuing debate (Vallois 1952; Brace 1964, 1967; Wolpoff 1968) involving many aspects of evolutionary theory. No treatment of the subject under consideration can be begun without a careful consideration of these issues, yet in the current instance

there is no consideration at all, careful or otherwise.

There are many other errors, both major and minor, but a list of them would do nothing to change the assessment reached in the light of the above-mentioned points.

To repeat, there is so little possibility of using the data presented to cast light upon the problem to which the paper is addressed that one wonders why the paper was written. The specialist will learn nothing he did not already know, and the anthropologist whose interests lie in other areas will, if he manages to get through it, either be misled or left with a feeling of "So what?" One is led to ask what kind of review procedure lets articles such as this clutter up the pages of *CURRENT ANTHROPOLOGY*. This is the third time in as many years that *CURRENT ANTHROPOLOGY* has published an article dealing with human evolution where the standards of scholarship are so low that review policies would have eliminated it from consideration in another journal.

by E. LLOYD DU BRUL☆

Chicago, Ill., U.S.A. 19 III 69

Even some of the most solid of scientists seem not the least reluctant to set man quite apart from all other creatures, often in epic style: "Man is a glorious and unique species of animal" (Simpson 1964:285). This sort of thing introduces a mood that extends easily to casual usage in the ordinary textbook: "man qualitatively differs so very significantly from all other primates . . ." (Montagu 1960:89-90). The conviction that man is unique leads to a lack of logic when such tense topics as war intrude. For instance, Keith (1947, 1949), with his Victorian view of man's special place in nature, was completely convinced that war is a natural process of great biological value. This implies that the intraspecific killing of man is no different from the behavior of other animals. Montagu (1968:284) holds the opposite view: "war . . . is the most unnatural, the most artificial of all human activities." It is extremely rare that other mammals kill their own species. Thus, curiously, Montagu implies that man, who "differs so very significantly," should behave exactly like other animals. It has been suggested that "man is unique among animals because he can speak, or because he makes tools, or because he uses fire, or paints pictures" (Du Brul 1968:642). He is, then, also unique because he makes war!

The problem that is really plaguing us here is whether this behavior is truly inherent, i.e., somehow genetically fixed in our species. This has brought about considerable controversy as to whether there is actually such a thing as an

aggressive *drive* (Moyer 1969). Now, most mammals are aggressive, some highly so. The Order Primates certainly contains groups that display their intra-group aggression most ferociously. This may mean that they have a built-in "instinct" (neural circuitry) to fight against members of their own species. But Lorenz (1966) and others have demonstrated very convincingly that this activity is most carefully regulated. It is controlled again by built-in neuronal systems which operate as negative (inhibitory) feedbacks that switch off the aggressive process just short of actual killing. It is said to make this whole behavioral complex a very effective group-integrating device with high survival value for the group.

The most unambiguous way to probe problems of behavior is to investigate the structure operating the behavior and the behavior generated by the structure. The study can converge along two direct lines of attack suggesting a "natural experiment" (Du Brul 1950, 1965; Du Brul and Sicher 1954): (1) study of the structure and recording of the attendant behavior in parallel series of extant animals; and (2) study of the structure and recording of evidence of the implied behavior in parallel series of extinct animals. There seems to be enough evidence relevant to the problem of aggression to warrant an attempt to order it in terms of this scheme.

Evidence for the first study can be got from the results of extensive neurophysiological experimentation on aggression. These expose extremely interesting features of the brain structure and its behavior. An experimental animal can be induced to display aggressive behavior by electrical stimulation of specific brain structures (Moyer 1969). The same thing has been demonstrated during surgical procedures in man (King 1961). On the other hand, normally vicious animals can be made dramatically docile by surgical destruction of specific brain structures. The same results can be obtained in man (Ursin 1960). More strictly "behavioral" studies have shown that learning has a surprisingly strong influence on all the so-called basic behavioral patterns (i.e., eating, drinking, sex, etc.). Thus training may be one of the most important factors affecting aggressive behavior (Scott and Fredrickson 1951). Put in another way, inputs from the external environment can be manipulated to reduce the aggressive output to the environment in experimental animals.

Roper's paper approximates the second part of the above scheme, with the obvious difficulty that the brain cannot very well be studied in fossils. Its conclusions seem acceptable in terms of the evidence considered: that killing prob-

ably occurred among australopithecines, that it continued (with better evidence) with *H. erectus*, and that "sporadic intraspecific killing probably took place among *H. sapiens* in the Upper Palaeolithic."

The clearest kind of record we have is actual portrayal in cave paintings. Roper cites Graziosi (1960) in which several human figures are illustrated. His statement (p. 58) "all have arrows piercing their bodies" brings intraspecific killing into focus. A most interesting figure from Pech-Merle (Graziosi 1960: Pl. 257e) pictures a distinct human form with what seem to be seven arrows stuck into the torso. This reveals a remarkable parallel to paintings at Lascaux, where numerous horses show a stereotyped style "and, somehow, seven arrows seems the number of choice. This design has all the appearance of a repetitious ceremonial sequence" (Du Brul 1968:636). This strongly supports the notions of religious rites or, as Graziosi puts it, "killing magic." At any rate, it does express intraspecific killing.

At this stage of knowledge, intraspecific killing seems to have been present very early in the hominid line. It appears that there is an inherent *range* of aggressive behavior, at one extreme of which killing of one's own species can result. The experiments show that environmental influences can swing the behavior to either extreme. Learning, training, indoctrination—i.e., culture—can have a strong influence on the *portion* of the inherited range of behavior in which an animal operates. "There are certain basic circuits in the nervous system. When they are active, certain complex behaviors occur" (Moyer 1969: 104). In man, with the tremendous *quantitative* intercalation of neuronal processing circuits in the brain, perhaps some conditioned basic circuits are more easily "kicked off" than others.

It is possible that in very early tribal groups such a type of exaggerated aggression might have had some selective advantage, as Keith once proposed. Obviously it has long since lost any such advantage. Some authors will refuse to consider such a possibility, but things are not what we wish them to be. They just are. And non-scientists certainly do not hold a monopoly on wishful thinking.

by RAYMOND A. DART☆

Johannesburg, South Africa. 9 III 69

A catalogue of tabulated data and an historical review of the literature on cranial violence in the Pleistocene such as Roper has carried out is an onerous and useful undertaking. Her analysis of the literature should be serviceable to many enquirers desirous

of ascertaining where relevant preliminary information and opinions are to be found. Lack of contact with the objects concerned, however, is a self-imposed limitation of any such "survey."

There are many of my papers other than the two she has cited which have a direct relation to any objective enquiry into the australopithecine killing of australopithecines as well as to their killing of other animals for daily sustenance.

The first of these other articles worthy of study is "The Adolescent Mandible of *Australopithecus prometheus*" (Dart 1948b). That mandible, discovered at Makapansgat in 1948, provided such undeniable evidence of a single lethal blow that, combined with the two doubly indented australopithecine endocranial casts from the Sterkfontein site, it prompted me to write my initial paper on "The Bone-Bludgeon Hunting Technique of *Australopithecus*" (Dart 1949a) and to collate evidence upon "The Predatory Transition from Ape to Man" (Dart 1953).

It was only gradually that I came to appreciate the opposition to such views by those lacking forensic medical experience. Because of this opposition, instead of simply trusting my own observations (informed by repeated responsibilities in providing anatomical evidence for consideration in local courts of law), I consulted also the then head of the department of forensic medicine in our medical school and other experienced fellow medical men before writing the article on "The Predatory Implemental Technique of *Australopithecus*" (Dart 1949b). That comparative study dealt with the available primate material from all three australopithecine sites. Since each of the two other sites is separated from the Sterkfontein site by a distance of about 200 miles, the evidence from the three sites thus represents similarities in implement-manipulative hunting habits over 400 miles of territory. This situation, indicated by his own observations of some of the South African materials (again, from the point of view of one who has had practical forensic medical experience) is what had led Le Gros Clark to instigate that study. My research was confined purely to the skeletal parts of the heads of those primates: but the evidence for australopithecine hunting, killing, dissecting, and utilising skeletal parts naturally embraces the contents of the bone deposits as wholes.

Further, it would be misleading for those deeply concerned to omit attention to subsequent papers on the individual remains from Makapansgat: "Innominate Fragments of *Australopithecus prometheus*" (Dart 1949c), "The Second or Adult Female Mandible of *Australo-*

pithecus prometheus" (Dart 1954), "The Second, or Adolescent (Female) Ilium of *Australopithecus*" (Dart 1957a), and "The Makapansgat Pink Breccia Australopithecine Skull" (Dart 1962a). The fragmented or isolated conditions under which the skull and each bone and tooth or part thereof became fossilized can have their own bearing upon the nature of the violence to which the bodies of which they had formed part must have been subjected, not only before but after death.

An investigator may be mistaken in his deductions despite his background and study of the relevant material; but the expressing of opinions upon matters necessitating such direct observation as well as a thorough knowledge of the sites and an adequate study of the material objects themselves can scarcely be deemed equivalent in scientific worth.

Today evidence about the distribution of the representatives of the australopithecine phase of human evolution is being sought throughout the Old World. Such finds will either corroborate or modify the conclusions I drew and still maintain. Twenty years ago even the bipedal uprightness and the hunting abilities of australopithecines were subjects of academic dispute. "The Osteodontokeratic Culture of *Australopithecus prometheus*" (Dart 1957b) entailed first of all a decade of hammer-and-chisel labour to excavate it from the limestone, bone fragment by bone fragment, so these South African investigations were not hurried. To compare the Makapansgat australopithecine treatment of bones with that of Middle Stone Age humans in South Africa, we fortunately had the Kalkbank site only 70 miles distant (see Mason, Dart, and Kitching 1958). That comparative study led to the rescue from his cellar, and the subsequent investigation, of the 11,594 osteodontokeratic fragments from Pin Hole Cave in Derbyshire excavated and perceptibly preserved a generation earlier by the late Leslie Armstrong; and to the first publication in Great Britain—through the liberality of the Wilkie Brothers Foundation (Des Plaines, Ill.)—of a statistical study upon *Bone, Tooth and Horn Tools of Palaeolithic Man* (Kitching 1963).

Study other than the statistical of such early human work upon bone in Europe is not new. It was tackled by the late Henri Martin (1907–10) for La Quina and published in a volume of 315 pages and 66 plates with literally hundreds of photographic illustrations. But the importance of his work and that of others for the understanding of how hunting habits conditioned the development of mankind (see Allen and Morton 1961; Hogg 1958; Freeman 1964; Storr

1964, 1968) was beyond the comprehension of most archaeologists half a century ago. Fortunately, it did not escape Teilhard de Chardin's notice, and it underlay Breuil's (1939) rescue activities at Choukoutien.

The past century of failure to appreciate that, in the osteodontokeratic material and skins of the animals they slew and feasted upon, human beings and their ancestors had perpetually in their hands and at their disposal for millions of years the most tractable and serviceable material—from skin-soft to enamel-hard—for the making of both tools and utensils, has resulted in the loss of much domestic information of the type that these tools and utensils alone have been capable of supplying (see Dart 1959, 1960, 1965, 1968). The recent discovery that the hunting and eating of animals was not restricted to man but is practised by baboons from Kenya to South Africa (Dart 1957, 1963; Bartlett and Bartlett 1961; DeVore and Washburn 1963) and also by chimpanzees (Goodall 1963) has transferred the burden of proof to the shoulders of those who have postulated australopithecines incapable of hunting and of tool-making.

What has this to do with the killing of man by man? Directly, perhaps little, but indirectly, everything known hitherto to be necessary. The fact that a Makapansgat australopithecine humerus was broken by spiral twisting as for use as a scoop (Dart 1961b) and the evidence (Dart 1961a) that the first australopithecine occiput found 13 years earlier (Dart 1948a) had in all probability served as a bowl (Dart 1962b) may be to some minds unimportant facts. To the inferential mind of a "lumper" such as myself (Dart 1962b), they reveal an interest in skulls as bowls that extended from australopithecines to late Palaeolithic human beings, to the Scythian practices recorded by Herodotus, and even to those of the more modern peoples mentioned by Maringer (1960) and by Von Koenigswald (1951). Such a continuity involving violence, whether to the living or only to the defunct bodies of human beings, is explicable only through their common possession of the abilities of killing and also of utilising tools to dissect their prey.

by W. C. OSMAN HILL☆

Atlanta, Ga., U.S.A. 27 II 69

This paper is a very useful and informative compilation of the evidence in the scattered literature for the occurrence of intraspecific slaughter among hominids during the Pleistocene. Comments are appropriately made upon the distinctions between killing for sacrificial

purposes, anthropophagy, and interne-cine warfare. So far as it goes, the evidence is rather slender, and the author is correct in her conclusions based on this evidence. As pointed out, in several instances, there is no absolute proof that the killing was intraspecific, since in some periods, at least, more than one species of hominid occupied the same general area contemporaneously.

Hence the evidence for intraspecific warfare among Pleistocene hominids is remarkably deficient. However, until the evidence from postcranial remains is equally thoroughly sifted, one is hardly justified in a conclusion based upon trauma exhibited by the cranium alone, albeit this is the most readily available and capable of comparatively easy interpretation. Spears and similar weapons wielded from a distance are much more likely to find a target on the torso than the head and could be quite as lethal.

I would also express reservations with reference to the rather sweeping statement that among subhuman mammals "even isolated killing between members of the same species is rare." This is perhaps true as regards primates, but sexual fights between stags in which one or both participants succumb are fairly common, while fights among hippopotami in their natural environment are well authenticated by Pitman (1942). Although reported from captivity, the killing of a tigress by her mate mentioned by Buckland (1882) and Cornish (1895), arising from an accidental encounter, could equally well have occurred in a natural setting.

In conclusion, there can be no doubt that intertribal warfare is a result of environmental overcrowding, whether the conflict is inter- or intraspecific. That such overcrowding was unusual during the Pleistocene, i.e., before hominids were as prolific as they afterwards became, is surely the crux of the whole situation—coupled, of course, with mankind's unmitigated tendency to destroy his own environment.

by ARMAND M. OPPENHEIMER*

New York, N.Y., U.S.A. 12 III 69

This compilation of the paleo-pathological evidence of man's inhumanity to man provides rich pasture for the cultural anthropologist and the behavioral evolutionist. The author calls attention to the fact that in a natural environment man is the only animal that kills its own kind. Even rats exhibit this pattern only under artificial conditions. Does man's culture introduce artificial conditions?

The only category of evidence which can establish hominid hands as the source of injury is proof of its delivery by way of an artifact. As the author

plainly states, without testimony of action of osteodontokeratic, stone, or wooden instruments, the case must be dismissed. The material so carefully compiled therefore attests that homicide arose contemporaneously with hominid culture. Motives can only be guessed. Magic, superstition, ceremonial propitiation, are possible factors. Post-mortem funeral practices and ancestor worship must be considered.

"The evidence for intrahuman killing in the Pleistocene" cannot be utilized to support the arguments of those who assert that human aggression and violence are phylogenetically determined and "instinctual." Man's size, strength, and intelligence and his behavioral plasticity make him potentially dangerous. A complete history of his culture might enable us to account for the range of his conduct from the unspeakable to the sublime.

One might question allusions to the coexistence of more than one species of hominid in the same territory and to Upper Pleistocene "intraspecific" warfare between *H. sapiens neanderthalensis* and *H. sapiens sapiens*.

by ERIK K. REED*

Santa Fe, N.M., U.S.A. 9 III 69

Roper's interesting and thorough paper underlines the importance of correct usage of proper biological terminology and, in particular, of taxonomic restraint in human paleontology. To give every new find a separate name is in effect to label the individual specimens, using purportedly scientific names as catalog numbers rather than as genuine classification based on thorough analysis. The general trend recently has been, fortunately, toward classifying together forms previously referred to as separate species or even genera. A particularly admirable development along this line has been the increasingly wide acceptance of the idea that the Neanderthal race of Europe and the earlier Steinheim-Swanscombe group are both subspecies of *H. sapiens*; thus several of the instances of possible violence mentioned by Roper as possibly or probably not intraspecific would now be considered intraspecific, with perhaps uncertainty at the race, variety, or subspecies level. As this is a relatively minor point, for the present purpose, I think staying with "intra-human" is preferable.

More important, perhaps, is trying to guess whether the people involved thought of each other as human. Probably those of different groups, and surely those of sharply differing types, did not. Many tribes or even smaller units have been reported to kill any stray unrelated strangers; emphasis has been given to the fact that in Eskimo, Navajo, and many other languages the word for the people

speaking "means men"—that is, there is *no word* for people in general. In the recent age of discovery and colonization, the expanding Europeans killed off many American Indians, Australian Aborigines, South African Bushmen, and others, obviously not considering them fully human.

The theme is delightfully presented in a work that begins as imaginative science-fiction and turns into a philosophical tract on the nature of man—*You Shall Know Them*, by the French author Pierre Bruller, writing under his Resistance name, Vercors. For an extinct form, calling it human or not human is an academic matter; but in Vercors' story, an australopithecine group is discovered alive—is it murder or hunting without a license to kill one of them?

The claims for specific instances of deliberate violence and alleged cannibalism—in fact, almost all of those listed and analyzed by Roper—sound pretty dubious in most cases; probably her evaluation at the end is about all that can be said. Rarity of convincing evidence is not surprising. The view of Ashley Montagu can also be partially accepted; I picture nothing resembling serious or systematic warfare prior to the development of settled communities and the tremendous concurrent increases in human populations. But occasional fights and slayings, on a scale which would not at all seriously reduce population numbers, seem theoretically likely from at least the fully human *H. erectus* stage, and very possibly from the *Australopithecus* stage, onward.

by ADOLPH H. SCHULTZ*

Zurich, Switzerland, 10 III 69

I share the author's scepticism regarding the supposed prevalence of intrahuman killing in the Pleistocene, for I am convinced that the action of carnivores offers a more likely explanation for most of the cranial injuries found in fossil men. That the early hominids might have occasionally killed their own kind with primitive weapons is, of course, quite conceivable, but has not been proved. It appears more reasonable to assume that at least the great majority of early men with supposedly fatal cranial injuries were the victims of contemporary large carnivores. The latter would have had no reason to avoid man until after he had become effectively armed in relatively recent times, and sleeping or isolated men, women, and children are killed for food by leopards, lions and tigers to this day. In some parts of Asia, bears are even more feared than the large cats, and cave bears might well have been a real menace to cave man.

The large predators can break a human skull with a single blow or pierce it with teeth and claws more easily than

can any weapon of stone. In charging a man from the front, a lion may rear up and strike him on the top of the head, but more often a man is caught by stealth and bitten on the side of the head and neck, where many fractures have been found in fossils. A vertical blow of a predator's paw on the very center of the notoriously thick vault of a Neanderthal skull can stave in the thinner base around the occipital condyles without cracking the vault itself.

All but the heaviest victims are usually not devoured on the spot, but carried to some secure retreat with shade and nearby water. Frequently parts are moved again for later consumption, so that the bodily remains are scattered from the start. Tigers have been observed to cover leftovers with leaves or earth to prevent the birds of prey from discovering them. After a first meal, the predator goes to drink and then returns to rest in a place from which it can guard its prey; any crow, vulture, jackal, or hyena approaching too soon is promptly driven away or killed. Early hominids, following the assembling vultures in an attempt to steal some unearned meat, would surely also have been pounced upon and would have been less likely to escape than the natural scavengers. Of special interest is the often-attested fact that man-eaters usually leave the head uneaten, just as the heads of most other prey are rarely consumed. This could very well explain the remarkable frequency with which only isolated fossil skulls of man have been found.

The above statements are based upon the detailed accounts of the habits of the large carnivores contained in innumerable old and new books on big game, from which only the following few examples are here briefly quoted. In a thorough discussion of tigers and their prey, Burton (1933) mentions that "the skull is generally left uneaten as the dogs left the skull of Jezebel." Corbett (1946) states that of a girl carried off by a tiger only the head was recovered. Forsyth (1920) reports that tigers returning to their victims a second night "will finish all but the head," and of a man killed by a tiger it is mentioned that "some bones and shreds of flesh and the skull, hands and feet were all that remained." Selous (1908) describes how of a man seized and carried away by a lion "Nothing was ever found but his head and one foot." According to the same author, another man had been attacked by a lion which had driven an upper canine clear through the top of the skull and with a lower one broken the mandible. Guggisberg (1960) also says of lions that "man-eaters often will not eat the head and soles of the feet."

Contrary to various claims, not only hyenas and leopards, but even the largest

cats, do choose caves for their dens in some districts, as has been vividly described, e.g., by Caldwell (1924) for Chinese tigers and by Stigand (1913) for some African lions. It seems very likely, therefore, that the Pleistocene carnivores, even more varied and more numerous, could have killed early hominids in their caves or else have brought their remains there, among which skulls were most often left over. In some European caves the skeletal remains of Pleistocene cave bears, hyenas, and lions have accumulated in huge numbers together with the broken bones of many other animals (Zapfe 1954). That Rhodesian Man had been killed by some large carnivore was the convincing conclusion of Mollison (1937) from his careful examination of the original finds.

Though there is much evidence for the view that by the later stages of human evolution man had developed an active interest in the remains of his fellow beings and had even acquired various burial customs, head cults, and cannibalism, it does not follow that he did the actual killing himself, except perhaps in rare cases.

by N. C. TAPPEN☆

Milwaukee, Wis., U.S.A. 17 III 69

This review is a valuable contribution on a general problem important in the study of hominid behavioral adaptations through time. It is striking to see documentation of the large number of fossil specimens for which there is evidence of healed injuries to bone and of injuries at the time of death or shortly thereafter. Especially for early fossil hominids, this list reads almost like a catalog of our most important finds. In one form or another, the pattern continues strongly into the last glacial period. The extent to which this is an indication of the actual amount of violence prevalent in early times needs further investigation. There is more than a hint that favorable locations for preservation were kill sites or garbage dumps rather than living sites, especially in the caves in South Africa. This could create a great deal of bias in preservation and recovery of specimens.

The earlier specimens suspected of having died violently give some evidence that bludgeoning was the typical method of killing. Dart's (1949b) evidence for depressed fractures in skulls of baboons gives support to this idea. A thorough review of the evidence for bone fracturing in other contemporary fossil vertebrates seems appropriate, and it is worth observing that once again Dart (1958) has been ahead of his time in pioneering

such investigations. We need to know more about the condition of bone at gross and microscopic levels in different postmortem environments in order to augment the degree of rigor in this kind of research, however. Experiments in progress in my laboratories are designed to try to provide new information along these lines.

Bludgeoning may well have been the typical hominid use of weapons before the development of spears or projectiles, for which the archeological evidence appears to be extremely scanty before the last interglacial period. This behavior may be correlated with a peculiar phenomenon in the evolution of Pleistocene hominids which has received little attention. This is the great thickening in the tabulae of bone of the calvaria in the *H. erectus* stage. Weidenreich (1943), in particular, called attention to the great thickening of compact bone in the calvaria of Peking Man and other roughly contemporary hominids now usually referred to *H. erectus*. Tobias (1967) observes that the australopithecines are definitely lacking in this feature, as are the pongids; where there is great localized thickening of calvarial bones in these forms, it is accompanied by pneumatization. By late Pleistocene times the characteristic thickening of the compacta is no longer so much in evidence, except for the Solo skulls from Java. Tobias is aware of the problem (pp. 75-76):

For the moment we offer the comment that it is the thickening of the cranial walls in *H. erectus* that demands an explanation, rather than the thinning during post-*erectus* evolution.

Bludgeoning as a characteristic way of killing offers a possible explanation within the framework of selection theory. Thicker cranial bones would offer greater resistance to fractures, and thus greater survival value, as Coon (1962) suggests in the passage commenting on the Solo skulls, quoted in Roper's article. If clubbing was developed in the australopithecine stage, and struggles within or between hominid groups became common, individuals or groups with genetic potential for thick calvarial bones would have been favorably selected. If spears became the characteristic weapons at a later period, the selective advantage for thicker skulls would presumably then have been reversed, and later populations would have lost this characteristic. This conjecture seems to fit the timing of what actually happened, except for the Solo skulls. Two possible explanations for this exception suggest themselves: (1) the late Pleistocene dating is inaccurate, or (2) the south-

eastern Asia area was at the time a partially isolated zone in which the local hominids had remained at an earlier stage of human evolution and perhaps were also peripheral culturally.

Reply

by MARILYN K. ROPER

I wish to thank those who have helped to shed light on the topic of this paper by their participation in the discussion. One clear need, so well illustrated by the comments of Schultz and Tappen, is for the refining of laboratory techniques so that more can be learned about the nature of the wounds. As these techniques are developed and applied to the fossil material in question, many of the claims or counter-arguments enumerated here may be verified.

Dart has brought to our attention a claim of violence he made concerning a mandible found at Makapansgat in 1948 which I overlooked in my survey. This mandible was found eight months after, and 20 feet away from, the original Makapansgat find, an occiput. It is possible that the occiput and mandible belonged to the same individual, but not likely (Dart 1948b:393). The evidence upon which Dart (pp. 393–94) bases his allegation of purposeful killing is as follows:

The fractures exhibited by the mandible show that the violence, which probably occurred in fatal combat, was a localized crushing impact received by the face slightly to the left of the midline in the incisor region, and administered presumably by a bludgeon. The result of that decisive blow, as far as this mandible is concerned, was that the 4 permanent incisors (and perhaps the left second deciduous molar) were sprung from their sockets and the bone was shattered. Seen from the front the mandible displays abrasion and fine cracking over the upper half of the left canine region (or canine alveolar jugum) together with 2 diagonally-situated fractures that course downwards and leftwards from the right first premolar and the left second premolar sockets respectively. Seen from above and below it is apparent that the posterior and rightward direction of the force applied was so great as to split the left half of the massive body longitudinally in several places. Thus most of the lateral part of the left side of the body behind the second premolar socket (and therewith apparently the left ramus behind the second permanent molar) became separated from the remainder of the bone. But the slight degree of displacement of the fractured parts, their hinged relationship to one another and the absence of any evidence of healing at the fractured margins, show collectively that death was virtually instantaneous and that the fractured parts of the bone were held during desiccation in approximate apposition by some of the attached

The hypothesis outlined above needs further development and examination. Space and time limitations do not allow this, however. In any case, I hope it will contribute, as does Roper's review, to

surrounding tissues until they became embedded in the limestone matrix.

I have dealt in detail with these stigmata of deftly directed force to show that this youth probably met his fate at the hands of a kinsman more expert than himself in the accurate application of directed implements. As no purposely fashioned implements have as yet been discovered in the deposit, the implement was probably an ungulate long bone of the type discussed in my earlier paper or an unworked stone.

At the Makapansgat site on Table 1 of my article, the mandible should be separately listed in the "Remains" column and Dart 1948b:393–94 should be shown in the "Claim of Violence" column. Dart also mentions in his comments that there were *two* doubly indented australopithecine (*Plesianthropus transvaalensis*) endocranial casts from the Sterkfontein site. The manner of his comment indicates that both of these casts must have been found before he wrote the article (Dart 1949b) in which the cranial injuries of australopithecines are listed (see Appendix A of my article). However, in this article, only one of the *Plesianthropus transvaalensis* individuals (Type 2) is said to have been hit with a double-headed object. Was it Type 1 or Type 3 that was also supposedly hit with a double-headed object, and why wasn't this information included in the discussion of the cause of the damage? Because a number of scholars have placed greater significance on the double-depressed fractures as indicating a blow by another hominid, this is an important point to clarify.

Hill remarks that we cannot make an assessment of intrahuman killing in the Pleistocene until the evidence from postcranial remains is equally sifted. Physical anthropologists have no doubt overlooked this aspect of study with regard to postcranial remains in some instances. Certainly in the published literature on fossil men, claims of purposefully inflicted postcranial injuries are rare. The only ones I found, and I was as much on the alert for them as for allegations with regard to injuries of the skull, were Shanidar III and Skhul IX. In this respect, Tappen's theory of the cause for the thickening of compact bone in the calvaria of *H. erectus* is interesting.

Reed makes the important point that, no matter how many hominid species taxonomists think there were in a given area at a given time, the real issue is how many species the humans involved

the trend toward relating archeological evidence to ecological and cultural theory in developing new perspectives on human evolution.

thought there were. The tendency toward pseudo-speciation is all too prevalent in our society today. Did it arise along with culture(s)? And could this account for the loss of controls against the final death blow? Du Brul and Bhalla suggest that one way to find answers is to study the structure operating the behavior (i.e., the brain). Research on this complex that developed so rapidly, evolutionally speaking, is crucial. Theories of MacLean (1968), Du Brul, and others mentioned in his comments are highly pertinent to the topic of intrahuman killing in the Pleistocene. Further research in and discussion among many disciplines seems essential to any understanding of this aspect of the nature of man.

I appreciate the criticisms that Brace has made concerning specific items in the tables. Some are valid (e.g., Saldanha and Gibraltar); others are questionable (e.g., St. Brelade, Barma Grande, Spy). Many of his reproaches have to do with new fossil material or new dating on old skeletal material. The tables should be revised in accord with new information, which will slightly alter the ratio of fossils upon which there are claims of violence to those upon which there are none. Fortunately, students will have access soon to the complete *Catalogue of Fossil Hominids* (see Oakley and Campbell 1967), in which this new information is included. Apparently there are no claims of violence attached to any of the new finds (e.g., Jacob 1967, Woo 1966). Thoma (personal communication, April, 1969) comments that there was "no trace of violence" with regard to the Vértesszőllös cranial remains.

Brace mentions the controversy over the possible injury on the right superciliary ridge of the original Neanderthal find. As far as I can discern from reading Schaaffhausen (1861) and Busk (1861), the controversy revolves around whether or not there was an injury at all, not whether purposeful violence was involved. This criticism and several of the broad condemnations of my article made by Brace are due to a misunderstanding on his part of the purpose of the paper. As is clearly stated in the preface:

The present paper is an attempt to collect and record the claims, based on material evidence, of archaeologists and physical anthropologists relating to intrahuman killing and warfare in the Old World during the Pleistocene. . . . Because I have not personally studied the damaged fossil bones and

the cave paintings which constitute most of the relevant material evidence, this article may be viewed as a basic preliminary survey (with occasional analytical comments) of the literature pertinent to the topic under consideration.

It would be beyond the realm of this article to review skeletal evidence where warfare or other homicidal activity is known to have caused death. Presumably, many of the physical anthropologists whose claims or counter-arguments I have listed have done so, and this experience has been reflected in their assessments. It is a summary of these assessments to which this paper is primarily directed.

In his attack on my handling of taxonomy, Brace shows once again that

he has missed the main thrust of the article. He says,

at least eight species and possibly five genera are used in text and tables which are not acceptable to the majority of serious students of human evolution at the present time . . .

It is precisely because these taxonomic names (e.g., *Plesianthropus transvaalensis*) are not acceptable today and rarely mentioned in introductory courses that I took pains to list them in the tables and/or mention them in the text. There are many direct quotes in which the authors (some writing years ago) use these names. Students would get lost without some reference to them. The

only difference between the taxonomic point of view taken in this paper and that of many scholars today is my use of *H. neanderthalensis* instead of *H. sapiens* var. *neanderthalensis*. The latter classification may indeed be correct, and, if so, a case for intraspecific killing would be extended farther back into the Pleistocene.

A truly comprehensive analysis of the whole subject of fossil bone injuries, using newly developed laboratory techniques, is sorely needed. I hope that some qualified, open-minded specialist will soon undertake this project. Archaeologists and physical anthropologists have an opportunity to contribute their findings to the current debate on man's survival.

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